

The Acheulian occupation at Amanzi Springs Uitenhage district, Cape Province

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“There was a secret and a fascination in the mysterious ‘craters’ that appealed to the adventurous. The rugged ironstone throats, choked with treacherous black mud or with blue and yellow clays, whence came the ooze and the hot mineral springs and the faint smell of sulphur, might lead anywhere and mean anything”.

Sir Percy FitzPatrick, “Amanzi: A private record of the first decade”, circa 1924.

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1. INTRODUCTION

The Acheulian site is on the north flank of a hill rising to 610' above sea level and overlooking the incised valley of the Coega River in the Uitenhage District (25° 29' E., 35° 42' S.). The northern portion of the hill and the slopes below which include the total extent of the spring deposits with which the Acheulian occupation is associated, are on the farm Amanzi Estates, formerly Balmoral and originally Rietheuvel (Uit. Q.1.41).

The occurrence of artefacts in the spring deposits was recorded as early as 1924 in a private report (FitzPatrick, 1924) and their discovery was the result of the development of the springs for an irrigation scheme during the previous decade. However, it was not until 1963 that a preliminary archaeological investigation of the springs was carried out by Inskeep and a report published (Inskeep, 1965). This present paper outlines the results of more extensive excavations made in 1964 and 1965 as a follow up on the findings of Inskeep's investigation.

The main result of the 1963 excavation showed a series of spring deposits relating to two separate phases of accumulation with a quantity of "Early Stone Age" material included in the lower deposits. In these same lower deposits finds of reasonably well preserved wood were made, pointing to unusual conditions for preservation.

The sealed context of the cultural material and the preservation of wood were factors of sufficient importance to warrant further investigation. The preliminary excavation was too limited to establish the extent of the occupation, to indicate whether there was any relationship between the wood found and the cultural material, to allow firm conclusions as to the mode of occurrence of the cultural material and its typology or to give a detailed picture of the structure of the deposits. These then were the objects of the follow up excavations. Field work was carried out over two seasons, August to November, 1964, and from September 1965 to January 1966.

2. THE SPRINGS

A number of springs occur in the general region but with the exception of the Amanzi springs these are "pure" water springs (Bond, 1946, "Type E"; du Toit, 1928, p. 38) issuing from the margins of the Uitenhage artesian basin (*vide* Haughton, 1928; Engelbrecht *et al.*, 1962) with waters characteristic of the underground waters in the Cape System. They are not associated with large scale deposition. The Amanzi waters are more concentrated, thermal (32°C.) and chalybeate (Hall, 1938, p. 495; sample no. 3549) and are related in composition to bore-hole waters drawn from the base of the Cretaceous System (Kent, 1950 p. 252; Rogers, 1909; Engelbrecht *et al.*, 1962, p. 41). These waters probably derive from the basal, arenaceous, pyrite rich zone, fed by fissures in the underlying Cape System, a conclusion supported by du Toit (1928) and Kent (1950).

From the occurrence of the springs, it is clear that during the Middle-Upper Pleistocene and Recent times the hydrostatic pressure in the artesian basin was sufficient to force the waters up through the flanking Variegated Marl (Cretaceous) on the margin of the hill. The occurrence at this locality is probably explained by a complex interplay of a number of factors, including the pre-Cretaceous topography, the location of deep seated fissures and shatter zones in the underlying Table Mountain Series quartzites (Cape System) and perhaps not least, the proximity to the Uitenhage or Coega Fault, a major fault in the artesian basin. The Coega fault with a throw of some 3,800 feet to the south west (Marais 1964) is the boundary of the Coega Compartment, a discrete hydraulic unit in the basin. Bore-hole records (J. P. M. Niven, *pers. comm.*) show the quartzites of the core of the hill to form a cliff-like margin on the north side, but the contributory importance of the other factors is more difficult to evaluate. That conditions here are unusual is supported by the fact that springs of the Amanzi type are not repeated on the same scale elsewhere in the artesian basin.

The springs have ceased to flow as the result of bore-hole pumping in the basin and the water table is now some 60 feet below the natural outlets on the hill. Originally the waters issued from a number of centers located in a cluster on a shoulder of the hill with two other centers at the foot of the hill. Spring deposits cover this whole hill side over an area some half a mile by half a mile and to a maximum thickness, indicated by bore-hole records, of about 22 feet. There is thus a considerable volume of deposit worked by the spring action and re-distributed by hill wash. As far as can be gauged by included cultural material from the spring centers that have been excavated or disturbed by the cutting of irrigation furrows, all are of similar age. The deposits are referred to the Amanzi Springs Formation.

The dating of the spring deposits at present depends on the included cultural material and not *vice versa*. Although a time sequence in the cluster of springs on the north flank is probable as they are unlikely to have been simultaneously formed and active, the chronology is not fine enough to detect this and again not all the spring depressions have been excavated. On a slope such as this a tendency for the active focus to migrate up slope in time might be expected and the higher centers in the cluster may prove to be younger. On the exposures available it is impossible to correlate the spring deposits with the terrace deposits in the Coega valley with assurance. However the spring deposits, occurring on a level below that

TABLE 1

Formation	Member	Sub-Units	Cultural Associations	Dating
AMANZI SPRINGS FORMATION	BALMORAL MEMBER	Poorly sorted sands with considerable lateral variation. Includes well stratified facies, grey mottled sediments and channel fill deposits.	Unknown	31,000 $\pm$ 1,200, 1,100 years B.P.
	RIETHEUVEL MEMBER	Grey black silts Brown humic sands	Acheulian	60,600 $\pm$ 1,100 years B.P.
	ENQHURA MEMBER	Marginal clays; White sands; Basal clays.	Acheulian	

Provisional nomenclature adopted for the spring deposits.

of the end-Tertiary peneplain, date to the Pleistocene and the inception of the present valley system. Two Pleistocene terraces are recognized in the Coega Valley, terraces 1 and 2 (Engelbrecht *et al.*, 1962), and there is some evidence to suggest the spring deposits in the main are younger than these aggradations. Terrace 2 is a well marked feature some 50 feet above the present incised Coega River and consists of poorly sorted coarse gravels.

The spring centers occur as horse-shoe shaped or circular depressions. However, a number have been modified by banks and furrows in modern times for irrigation purposes. They appear consistent with the structure of typical mound springs occupying spring eroded hollows, in this instance in the soft Cretaceous sediments. The horse-shoe form appears to be a reflection of slope, the open end being the down slope or outlet end.

The spring deposits consist of a series of sands, silts and clays with great lithological variation resulting from the sorting and transporting action of the waters. The build up of the deposits within the depressions takes the form of a lens or mound-like core of sands washed free of the finer clay and silt grades and flanked by sands, silts and clays on the margins. The longitudinal section of the horse-shoe depressions is complicated by regrading of the outlets.

There is ample demonstration in the cuttings and exposures for localized and widespread natural disturbance of the deposits. Stringers of sand form upshoots into overlying deposits and in places structures resembling flow structures are the result of actual movement and churning. Probably the most important feature of this nature noted is a disconformity which is of major proportions. It was seen in the initial cutting made by Inskeep and traced in two adjacent depressions in the subsequent work. These centers show clear evidence of being re-activated following a period of quiescence when they became choked with vegetation and silted up. Radiocarbon dating suggests this second phase of activity took place in the Upper Pleistocene.

The chemical deposition of iron is marked in the channels leading off bore-hole waters from the Edwards bore-hole within the area of the main cluster of spring centers and the spring waters are recorded to have had a similarly high iron content (Hall, 1938). The development of ironstone or iron-cemented horizons in the spring area is thus easily explained. In some areas, a hard sheet of irreversibly dehydrated iron oxides has formed as a lateritic-like surface deposit. Iron has also been deposited in concretionary form occurring in medium to large sized blocks in the deposits or again as zones of ferruginization within the sequence.

Where ferruginization is marked, all macroscopic structures have been destroyed. The iron-stones do not relate directly to the black boggy earth described by Barrow (1801) as suggested by Inskeep (*op. cit.*) this black earth being more reasonably correlated with the organic rich silts that formed at the springs during periods of diminished activity. In the present cycle of hill slope development, the sheets of iron-cemented material are a major factor in inhibiting the erosion of the unconsolidated spring deposits.

In view of the artesian origin of the spring waters, it is perhaps tempting to relate the periodicity of spring activity reflected in the spring deposits to long term fluctuations in the intake of water into the basin and thus to regional precipitation (see also Inskeep, *op. cit.* p. 242). In this way the springs may evidence pluvial conditions. Some support may derive from the botanical evidence of the macroscopic plant remains (Wells, 1970) that suggests the earlier main phase of spring activity was associated with a vegetation more mesic than developed at present. This, however, relates specifically to the micro-environment of the springs and at present there is no direct evidence such conditions were regional.

Periodic activity at any one center or group of spring centers may be explained simply by a shift in the main outlet. This can result from openings in the aquifer collapsing with the escape of water, effecting a decrease in pressure in time and possible cessation of discharge. It may also be linked to flush flow phenomena (Dixey, 1966) that are due to the elastic effect of the aquifer. The concept of flush flows is useful in explaining the initial excavation of the spring depressions, thereafter sedimentation and the regrading of sediments becoming the dominant processes. One feature of this artesian system that is evident from the modern bore-hole records (*vide: Engelbrecht et al., op. cit.*) is the limited capacity of the reservoir and new bore-holes on the farm Sutton Vallance some ten miles from Amanzi caused a marked diminution in the discharge from the Amanzi bore-holes within a week. For the present any correlation between spring activity and regional precipitation must be regarded as tentative. To some degree cycles of activity and quiescence can be regarded as normal to a spring complex. Even the best evidence for changed conditions at the site, which is in the humification of organic material in a prominent silt bed indicating a lowering of the water table prior to the second phase of activity, is capable of a non-climatic explanation.

The present day vegetation of the site and the surrounds is typical Addo Bushveld (Acocks Type 23d (1); Acocks, 1953, p. 82), a special form of sub-tropical valley bushveld developed in the coastal valleys in the eastern Cape and Natal. This is a climax vegetation of the drier valleys (Amanzi, average rainfall 15.1" p.a.) and it grades by easy transition into the dry coastal forest vegetation represented in this region by a relict area at Alexandria (Acocks, *op. cit.*, p. 31). On the mountainous margins of the Uitenhage Basin, the original woody cover has been replaced in modern times by a False Macchia and some extension of the Addo Bushveld area may have taken place. As relief exerts a strong control on the distribution of rainfall and vegetation, the relationship of drier valleys to wetter uplands would have remained through the Pleistocene. Conditions may have alternately favoured the invasion of forest or Karoid species in the Bushveld zone but its general character has probably been maintained over a long time period.

3. THE EXCAVATION

In all thirteen cuttings and seven pits were made in the spring deposits on the north flank of the hill. Some of these were primarily for stratigraphic information and the main excavations of archaeological interest were located at two adjacent spring centers, labelled Area 1 and Area 2 (Fig. 3). Area 1 included the original cutting of Inskeep which was deepened (Cutting 1) and extended (Squares 1 and 2 and Cutting 10) (Fig. 4). From an irrigation furrow in the floor of the other depression, Area 2, a number of Acheulian artefacts had been discarded on a dump and this site was chosen for excavation to amplify the results from Area 1 (Fig. 5).

As far as could be seen, the irrigation furrow was the only modern disturbance Area 2 had suffered.

These are not the only spring centers with known associations of cultural material. Artefacts can be seen eroding out of the deposits in the spring center immediately down slope of Area 2, the sinking of the pump sump of the Edwards bore-hole produced further finds and a number of dumps from furrows show some disturbed artefact material. There is thus ample scope for further excavation should this be warranted at some future time.

Area 1

This depression was used at one time as a reservoir and the softer deposits in the floor were scraped out to deepen it and the outlet end blocked off. The original form was horse-shoe shaped. Iron cemented sediments and a compact grey black silt bed limited the scraping operations on the sides of the depression and in places in the floor a tacky clayey sand was likewise a restricting factor. The excavation of Cutting 1 was into this artificial bank of the depression exposing the truncated upper deposits lying against the sloping surface of the main disconformity. The bulk of the deposits relating to the second phase of spring activity had thus been removed over the center of the depression.

Exposed in Cutting 12, Square 1 and 2 and the deep sounding of Cutting 1 was a clean white sand, the basal member of the sequence (Figs. 6 and 7). The margin of this sand body dipped steeply beneath flanking sediments in Cutting 1 where it was traced and a similar dip is inferred from exposures in Cuttings 11 and 12. The structure of the sand body is possibly a lens or mound. Because of the unconsolidated nature of the white sands, excavation within them was restricted. Limited cultural material occurred in and on the sands in Square 2 as well as isolated pieces of wood and the stems of a buried herbaceous plant community in botanical context. The burial of the herbaceous community which could be seen rooted in clayey partings in one exposure in Square 2, evidences rapid deposition locally (Plate 14). The only diagnostic cultural material found in Square 2 was a group of large tools that included a handaxe, a cleaver and two narrow bladed cleavers (Plate 35) lying on the surface of the sands and covered by overlying deposits of the spring succession. As the probability of such a group occurring by chance at this site is very low, cultural association is an acceptable assumption for these tools.

A brown sand overlies the white sands in Squares 1 and 2 and in Cutting 1 and it includes abundant stems of the herbaceous plant community. In part these stems form a matted mass and a woody plant with a marked pith is another important constituent of the remains in this horizon (Plate 13). Away from the center of the depression seen in Cuttings 1 and 10, the brown sands grade into a light greenish clayey sand in which there are no plant remains. This gradational change may approximate closely to the outer line of the fringing vegetation around the spring center although aeration and oxidation in the greenish clayey sands have been obvious factors in differential preservation. The mode of deposition of the brown plant rich sands is indicated by two thin black clay bands traced in Cutting 1. While not extending over any great area and thus of limited value as markers, they show the brown and greenish sand facies to have been deposited with a low dip away from the center of the spring (Fig. 7).

Although wood remains occur throughout the brown sands, near the top of this deposit and between the two black clay bands noted above, a wood rich zone of localized extent was traced in this excavation (Fig. 11). This wood occurrence was intersected in the 1963 excavation and a sample for dating was collected from it. One object of the present investigation was to establish the nature of this wood occurrence and its relationship if any to the cultural material. In the limited exposure of the original cutting (Inskeep *op. cit.*) it was not apparent that the deposits in this section were truncated by the disconformity with pot-holing down into the level of the brown sands at the wood rich zone. Some cultural material had been redeposited

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in the pot hole fill and with churning up of the interface between the fill and the brown sands, this part of the cutting was unsatisfactory for testing any associations. A cutting into the west wall, Cutting 1 extension, however, proved adequate in this respect and here the wood was found to be lying on a definite surface. The only cultural material found on the same surface between clay band markers was a single untrimmed flake. No cultural material occurred below the wood rich zone in Cutting 1 extension (Plate 5). No direct relationship between the wood occurrence and the cultural material can be suggested and it is evident that the wood is a natural accumulation. Root bases with a diameter of up to 12" and small twigs 1" in diameter are included in the wood sample recovered and these represent the more resistant or easily transported elements of woody vegetation washed or blown from the immediate surrounds and accumulated by drift against the herbaceous plant community fringing the vent of the spring.

While there is disturbance of the brown sands and greenish clayey sands where truncated there is no evidence of more widespread disturbance in Cuttings 1 and 10 in this horizon. The black clay bands support this. This is important in that the main artefact sample from Area 1 was excavated from the top of this horizon and the contact with the overlying deposit. The base of the artefact occurrence in Cutting 1 is the wood zone and in Cutting 10 at an equivalent depth in the greenish clayey sands there is a diminution in finds. The deep sounding in Cutting 1 provided a test of the lower and apparently sterile part of this horizon. The artefacts are thus distributed through a thickness of some four feet. It is considered that under the conditions of deposition at the site, material in the top of the white sands as found in Square 2 is possibly of equivalent age.

TABLE 2

AMANZI SPRINGS FORMATION; AREA 1, CUTTING 10. GRADING ANALYSIS

SAMPLE No.	AMS 31	AMS 30
Location	10—15/30—35	10—15/30—35
Height below datum.	—11 feet	—7 feet
Cultural relationship	Base of artefact zone	Top of artefact zone
Grading Analysis	Sand (0—4 ϕ) 58 %	Sand 16 %
	Silt (4—8 ϕ) 28 %	Silt 62 %
	Clay (8—12 ϕ) 14 %	Clay 22 %
Field Description	Light greenish sand	Grey Black Silt
	Rietheuvel Member	Rietheuvel Member

The overlying grey black silts (Plates 3 and 4) are developed to a thickness of more than 5 feet in the north wall of Cutting 10. The dark colour is due to humified organic matter which is readily leached in alkali. Apart from a few flecks of carbonized stems, no macroscopic plant material is preserved. The contact with the underlying sands is locally sharp but more frequently gradational on colour and in places there is some interdigitation. The deposits are conformable and do not evidence a break in deposition. In excavation no distinction could be made between cultural material in the base of the silts and the top of the underlying sands because of the nature of the contact.

Although now a compact hard deposit, the original form of the grey black silts would have been a soft organic earth and they would not have formed a very effective seal over the artefact zone they blanket. This offers an explanation for a few cultural finds (Plate 52) which on typological grounds must be considered as intrusives into the main Early Stone Age artefact sample that occur in the top of the artefact zone in Areas 1 and 2. The contamination

in Cutting 10, for example, is not localized and could not be explained by root penetration or similar mechanism. However, the number of intrusives is apparently low and they do not invalidate the conclusions reached in the analysis of the artefacts. The grey black silts at the later stage formed a sufficiently cohesive body to be smoothly truncated by the erosional surface (Plate 4) on which a few cobbles and pebbles were found. The intrusives are not of a later date than the compaction and humification of the original organic earth and the re-shaping of the original deposit is good evidence of a dry period at the end of the earlier phase of spring activity. The brown sands and grey silts are referred to the Rietheuvel Member of the Amanzi Springs Formation.

The disconformity marks what is evidently the re-activation of the spring as renewed deposition gave rise to a different series of deposits. These sediments of the Balmoral Member are poorly sorted sands. The lower horizon of the member is referred to as the "pothole fill" which is unbedded and shows some flow-like structures. These deposits occupy irregularities in the unconformable surface and include derived cultural material. A series of conformable, bedded, fine sediments overlie the pothole fill and show a shallow dip outwards from the center of the depression. They are intercalated with bands of what have been termed "mottled grey sediments" in the field. In Cuttings 1, 10, 11 and 12, the development of concretions or sheets of ironstone in the younger sediments has been pronounced. The "coals" and hearth mentioned by Inskeep (*op. cit.*, p. 236) in Cutting 1 are features related to concretion development. Little organic macroscopic material is preserved in these sediments, although by systematically breaking open clods of sediment a small sample of leaf fragments was obtained. A single piece of wood shrunk within its original cavity from the layered sediments in Cutting 10, provided the only sample for dating (I-2241). A few small flakes were the only cultural finds made, but the sample is too limited to have any typological significance.

From the succession, a reasonable picture of the history of the spring can be deduced. The main phase of activity of the spring resulted in the build-up of a central core or mound of sands with flanking sands and clayey sands anchored by vegetation. This was followed by a period of diminished activity possibly as the discharge reached a steady state and the humification of the grey black silt bed evidences a drop in the water-table and a period of quiescence. At a later stage the spring depression was re-excavated and activity marked by the deposition of poorly sorted sediments. The Acheulian occupation occurred during the final stages of the initial activity or build-up of the spring deposits.

Area 2

Modern disturbance in this depression is limited to a silted-up furrow following an irregular course up one side for the whole length, a branch of this crossing in the center to the opposite side, and an old water hole, also silted up, of which there is no local knowledge.

The stratigraphy and structure of the deposits is very similar to that described for Area 1. Test pits on the hill slope above (Fig. 3, Pit no's 1, 2 and 5) show this depression to be cut into Tertiary-Cretaceous sediments, although bedrock was not reached in the excavations within the depression.

The initial excavation in Area 2 was Square 3 which was stopped in a clayey horizon that overlies white sands. The sands were intersected in a pit subsequently dug in the floor of Square 3 and were shown to dip steeply on this edge of the depression. The surface of the sands was exposed in a trench including Cuttings 6 and 7 extending across the depression, and Cutting 5 exposed the flanking deposits on the opposite side of the depression. These excavations gave a section across the full width of Area 2. Cuttings 8 and 9 were started with the object of obtaining a longitudinal section of the deposits; however, the quantity of cultural material found on the surface of the white sands in Cuttings 6 and 8 made it necessary to extend Cutting 8 as an area between the furrow and Cutting 6. Extension of Cutting 8 beyond

the furrow was restricted by an ironstone sheet. Finally a deep sounding was sunk in the white sand body and other cuttings were made for stratigraphic controls (Figs. 5 and 13).

Correlations have been made between the deposits in Area 1 and Area 2 on the basis of lithology. In Area 2 the white sands in the center of the depression are underlain by basal clays in Cutting 5 and in the Deep Sounding. The marginal clays in Square 3 and Cutting 7 overlie the white sands and form a bank against which the deposit of the Rietheuvel Member were laid down unconformably. The recognition of this disconformity is important as it is one line of evidence supporting the distinction drawn between the basal Enqhura Member and the Rietheuvel Member. Differences in the lithology of the two units are also marked (Butzer, in preparation).

The basal clays are light yellow to green with sand stringers or inclusions. As they appear to extend beneath the edge of the white sand body in Cutting 5, they pre-date at least the later build up of portions of the sand core. The clays were tested in a cutting below the irrigation furrow in Cutting 5 and here as in further exposures in the furrow 60 feet from Cutting 5 (Plate 11) the Acheulian artefacts were found on top of the clays and in the overlying deposit. The white sands are more variable than the equivalent horizon in Area 1 and include bands or discrete segregations of clayey material within the sand body. Ferruginization is locally pronounced. This facilitated excavation within the sands and the Deep Sounding intersected two sloping disconformable surfaces on which natural stone and artefacts were found (Plates 9 and 10). For convenience the surface of the sand body which shows a number of shallow irregularities is labelled Surface 1 and the disconformities within the sands, Surfaces 2 and 3. The latter surfaces (Fig. 13 and Plate 14) dip towards the outlet and in view of the concentration of material on the surfaces they may represent a channel or line of wash. The surfaces slope up towards Cutting 5 although they could not be traced in this cutting and hence the relationship between the artefacts in Cutting 5 and on Surfaces 2 and 3 is not conclusively established. A possible interpretation is given in Fig. 13 which suggests these surfaces were formed by reworking of the sands at the onset of conditions leading to the deposition of the sediments of the Rietheuvel Member. On this basis the artefacts on Surfaces 1—3 would be of equivalent age to the artefact accumulation in Cutting 5. A vent structure, defined as a vertical passage for ascending waters, cuts through the sands in Cutting 6 and dates to the age of Surface 1 as it is seen to truncate Surfaces 2 and 3 in the Deep Sounding. There are upshoots of sands injected into the overlying deposits and these mark the terminal activity after the blocking up of the vent by the brown sands. This is the only example of this type of structure re-encountered during the excavation. There is some concentration of artefacts around the vent structure on Surface 1 and wood from this locality included one piece in which the carapace of a woodboring beetle was found. Finds of macroscopic plant remains in the white sands were limited but a sample of round seeds were recovered from Surface 3 (*vide* Wells 1970) and wood from between Surfaces 1 and 2 (Plate 15). Individual stems of the same herbaceous aquatic plant as found in Area 1 were noted.

As in Area 1, the sub-units of the Rietheuvel Member are brown sands and grey black silts. The brown sands are of variable thickness and wedge out to a thin band in Cuttings 7 and 8, being best developed in Cutting 6. A natural channel (Balmoral Member) cuts through the grey black silts and brown sands to the surface of the white sands at the junction of Cuttings 5 and 6. The brown sands have not been completely stripped off the bottom of the channel and they can be traced from Cutting 5 across Surface 1. The overlying grey black silts are typically developed in Cutting 5 however over Surface 1 they are apparently represented by a less compacted dark organic rich deposit of similar character (B¹ of Fig. 13). The grey black silts (B) and the dark organic rich deposit (B¹) are lithologically similar albeit the latter shows an increase in organic material from 2% to 8% over the former (Butzer pers. comm.).

Artefacts occur on the basal clays in Cutting 5, on the white sands in Cuttings 6, 7 and 8

and in the overlying brown sands. As in Area 1 the top of the artefact zone is the base of the grey black silts and the contact between these silts and the brown sands is conformable. The Cutting 5 occurrence has a thickness of some two feet. The scatter over the white sands includes some concentration of artefacts within irregularities on this surface and this material and that in the overlying brown sands has been labelled as from Surface 1. For discussion purposes a distinction is made between the artefact samples drawn from Surfaces 1, 2 and 3 and Cutting 5. The artefact density is considerably higher in Cutting 5.

Three sections cleaned out along the existing irrigation furrow between Cutting 5 and the mouth of the depression showed the sediments of the Balmoral Member to occupy a series of irregular washouts in the earlier deposits. They appear to represent sedimentation associated with wash across the floor of the depression from the most recent and more limited phase of spring activity. There is no evidence of any occupation associated with these youngest deposits. The channel-like structure that forms a break in the deposits and the artefact scatter between Cuttings 5 and 6 bottoms on the white sands. Stringers of brown sands have been caught up in the channel fill and there is local displacement of artefacts upwards. The structure is the result of waters escaping from the sand aquifer or core of the spring at this point. A series of mottled grey sediments are developed in Cutting 8 W 1 and 2 (Fig. 5) and a clayey facies in Square 3.

A very similar history of spring activity to that deduced for Area 1 can be suggested in Area 2. This may indicate the springs were simultaneously active and perhaps linked through the same fissure system. The sequence in Area 2 is more condensed and perhaps more complex.

4. THE LITHIC INDUSTRY

General

Stone artefacts are the only evidence of human occupation of the Amanzi Springs in prehistoric times. No certain artefacts other than in stone have been found, although wood and other botanical remains are preserved in sections of the deposit. The latter, together with the detailed picture of the stratigraphy of the deposit, contribute to a knowledge of the setting in which the occupation took place, but in large part what can be deduced of the occupants rests on the analysis of the sample of lithic cultural material.

All lithic material from the excavation has been kept, including natural stone occurring in association with the artefacts. This has proved of value in the investigation of this site where the primary context of finds cannot be assumed. The excavations were directed at those areas which were expected to produce evidence of the earlier occupation of Amanzi Hill and the main samples are referable to the Acheulian Culture Complex. They include a range of artefacts: handaxes, cleavers and other large bifacial tools, trimmed flakes, some retouched as scrapers, anvils, tools on cobbles, and other material that could be described as artefact waste, cores, untrimmed flakes and irregular pieces—indeed the range of tools and waste products that would be expected on or in the surrounds of an occupation site. While the industry as a whole has a relatively heavy and unstandardized appearance, there is no evidence contrary to the assumption that all the cultural material relates broadly to an advanced Acheulian industry.

The limited sample of later cultural material excavated from the site is not discussed here. There is no extensive later occupation at the two springs excavated, but such might be found at other springs in the same cluster.

Raw Material

At Amanzi, two types of lithic raw material suitable and used for artefact manufacture are abundantly available in the present day environment. It is not clear whether these were

equally available in Early Stone Age times, however, although both were used. These materials are quartzite and silcrete, the former being used with greater frequency. In Area 2 on Surface 3, for example, 12.6% of the natural stone in the pebble grade is silcrete, the percentage for the cobble grade being only 2.6%, and of the order of 1% silcrete for flaked stone and tools, (sample size 1324 pieces with natural stone making up 886 of this total). The figures for other excavated samples show comparably low percentages of silcrete used. All large tools such as the bifaces are made in quartzite.

The quartzite is derived ultimately from the rocks of the Cape System; its occurrence in the form of gravels is widespread and it is in this form that the quartzite has been used. Accumulations of gravels are to be found on old land surfaces dating from pre-Cretaceous times to the present and much of the material in the Quaternary deposits has been re-worked from earlier gravel deposits. The multi-cycle history of the boulders, cobbles and pebbles in the latter deposits is reflected in the high degree of rounding and the chatter marking of the surfaces. A feature initially somewhat puzzling at Amanzi was the high frequency of split cobbles and pebbles in the deposit, and this is certainly another inherited character. Haughton (1963, p. 274) refers to the sliced appearance of many pebbles produced by pressures within the Enon rocks (basal Cretaceous). The occurrence of sliced cobbles has had an interesting effect on the technique of handaxe manufacture (Plate 20).

Extensive terrace gravels (Fig. 2) occur at the foot of Amanzi Hill. These are poorly sorted and include material in the large boulder grade through to the small pebble grade. Cultural material, including a few handaxes, has been found on these gravels, but none *in situ* in the gravels. These gravels are one obvious source of raw material and there is a widespread, spatially ill-defined scatter of artefact "debitage" along the length of the terrace. Although finds of finished tools are extremely rare, much of thedebitage would not be out of place in an Acheulian sample and this probably evidences the working of these gravels and the results of primary blocking-out of tools by the spring inhabitants. A further local source of quartzite may have been available at the springs themselves. The northern flank of the hill forms a step or terrace about 100 feet below the top of the hill and although there is now no visible remnant of any accumulation of gravel that may have rested on this surface, its former existence can be inferred from the quantity of natural quartzitic stones included in the spring deposits.

The silcrete outcrops as large rounded blocks on the hillside and there is scree on the slopes. There is in fact no evidence that the outcrops were worked for raw material at this period and many silcrete artefacts retain the cortex of an original cobble form. It is possible that in large measure the technology of the Acheulian populations in this Cape Folded Belt region was adapted to the working of the more generally available cobble quartzites. For large tools at least, the detachment of suitably sized pieces of silcrete of sufficiently homogenous quality was not warranted when quartzite as an alternative occurred in the same environment and even small tools show no preferential selection of silcrete.

Quartzites and silcrete have very different fracture properties. Both are siliceous rocks, the former a mass of quartz grains with interstitial silica, and the latter a mass of colloidal (chalcedonic) silica in which quartz and other mineral grains are dispersed. Silcrete is the more isotropic, has a conchoidal fracture, and has seemingly superior fracture properties over the coarse irregular fracture of the granular, partially recrystallized and sheared quartzites. Whatever advantages as a raw material silcrete has over quartzite, these did not weigh in its favour with the Acheulian artificers and it is only with the appearance of the flake-blade industries of the Howieson's Poort culture dated to 18,000 years B.P. at the type site, that full potential of silcrete is exploited in the Eastern Cape. This later dominance of silcrete at Amanzi is reflected in an artefact sample excavated from Pit 3 and in defined scatters of artefacts on the top of the hill which include a high flake-blade frequency. Even in these flake-blade industries, quartzite remains important for the heavier and larger tools.

Typology and Techniques

In addition to gaining information on the structure of the deposits, the study of the mode of occurrence and the typology of the cultural material were part of the aims of this investigation. These aims are inter-related in that the typological classes were defined with the form of analysis used to study the mode of occurrence or context in mind. The description of the tool classes recognized is given below:

Natural Stone

This class includes rounded gravel which shows no flaking or obvious signs of use and, grouped with the gravel are the few slab-like joint blocks, spalls and exfoliated stone found, as well as split or sliced stone. The class has been sub-divided on size according to the Wentworth grade scale into Cobbles (256—64 mm.) and Pebbles (64—4 mm.). Pebbles less than 20 mm. in size were not recorded. The classification according to size is some indication of the relative proportion of the natural stone in respective samples outside that which could be expected to be of value as raw material for artefact manufacture. This includes all stone in the pebble grade. It is obviously impossible to distinguish manuports from natural accumulations and the quantity of natural stone associated with artefact occurrences is large in all samples. There would seem to be a parallel in the accumulation of rubble on artefact floors noted at some East African Acheulian sites (Howell, Cole & Kleindienst, 1962, p. 65), but at Amanzi no assumption can be made as to the association of the artefacts and natural stone because the context may be variously disturbed. An increase in the quantity of natural stone at the more obviously disturbed occurrences is apparent.

Inherited features such as chatter-marking makes identification of used cobbles as hammerstones difficult. Another inherited feature is the splitting or slicing of the natural stone and this would seem to have no cultural significance. A few cobbles and pebbles show exfoliation which could be the result of insolation or even fire.

Flaked Stone

Includes cobbles and pebbles which have been struck and one or two but seldom more flakes removed, but the original form retained. Here the proportions of cobbles to pebbles is a good measure of the relative importance of the two grade sizes to the artificers. In all samples flaked cobbles make up the greater portion of the flaked stone class (Figs. 17—19). By definition the flaked stone does not include any apparently utilized or trimmed pieces. Quantitatively the flaked stone class is small in relation to the natural stone in all samples.

Irregular Pieces

This class includes the irregular flaked material of different sizes that is not recognizably utilized or trimmed. Such material is usually considered as artefact waste and would be equivalent to the chips and chunks of the Kleindienst classification. Sub-division is on size and three grades are recognized: (1) Maximum dimension (or length) greater than 64 mm., (2) length less than 64 mm. and thickness greater than 20 mm., (3) length less than 64 mm. and thickness less than 20 mm. In sample counts, broken flakes are included with flakes, but flake fragments are included in the Irregular Pieces. The introduction of thickness into the grading of the Irregular Pieces was simply in order to include flake fragments in the third sub-division.

Cores (Plates 16—17)

Cores are defined as artefacts for the systematic production of flakes. Two sub-classes are recognized: (1) radial cores with flaking from the perimeter on one or both faces tending to produce a conical or bi-conical shape, and (2) irregular cores which are struck in two or

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more directions. This classification is comparable to that of Kleindienst except that several forms such as spindle, bi-conical, large, discoidal and pyramidal which show essentially the same radial flaking, are grouped in one sub-class. The sample of cores is not large enough to show the full range of variation and the class is considered to be under-represented. The cores for the production of flakes for large tool manufacture are not represented in the sample

TABLE 3
CORE SUB-CLASS FREQUENCIES IN AREA 2

		RADIAL	SMALL RADIAL (Discoidal)	IRREGULAR
Cutting	5	9	8	7
	6	11	10	3
	7	1	—	—
	8	2	3	5
	9	6	3	4

with the exception of one on Surface 2, Area 2. It is possible that such cores as are included in the samples from the spring sites represent the use of local raw material and much of the primary manufacture was carried out at the major source of raw material on the flats below.

The difficulty in defining cores as elements for flake production is that it pre-supposes that a clear distinction can be made between cores and core-like artefacts that may be tools, carefully flaked pieces which on size would appear to be too small to produce usable flakes, or on general morphology where thinness of cross-section and edge would seem to be deliberately shaped, i.e. the equivalents of the discs and discoids of Kleindienst's analysis. In the accompanying bar charts (Figs. 17—19) discs are shown as a separate class and discoids are grouped with cores. In that the discoids are distinguishable on size from the radial cores—the class into which they grade—and show no apparent edge trimming as opposed to platform preparation, they are classified as small radial cores. Trimming, unless bold, is not readily recognizable in quartzite. Statistically, the frequency of both discs and discoids is too low to have significance in these samples.

The radial cores are of interest in the flaking technique they illustrate. The cores in general can be orientated with either cortex or flaking on the under surface, the flaking being platform preparation and distinctive only when steep and stepped. The bi-conical and conical forms would seem only to be a stage in the reduction of the core. Other examples show a flatter surface over which the flakes were struck. The cores can be considered in conjunction with the flakes produced. It is a fair assumption that the bulk of the flakes showing radial dorsal negative scars have been produced from the radial cores. These flakes on an average have 3 to 5 scars and rarely more. These resemble more closely the flaking products from a disc-type core (*vide* McBurney 1960, p. 134). The predominance of cobble raw material in itself probably explains the absence of any large Victoria West cores and a single struck core of similar type is illustrated (Plate 17, No. 3).

Anvils

Anvils are all on halved cobbles and show characteristically coarse, steep step flaking along the cord of the cobble fragment. This term is used by Mason (1962, p. 141, Fig. 81, No. 2) for the same artefacts. Signs of battering are not very apparent.

Cobble Tools (Plate 18)

This class includes flaked cobbles that show trimming and/or utilization as tools. A subclass is a series of elongated cobbles with a single deep flake removed at one end giving a scoop-like end to the artefact and the tools show damage along this end (No. 5/261). Other cobble tools include heavy unifacial or bifacial cobbles with heavy damage along the working edge. Choppers would also be a suitable term to describe these tools, but is a term generally used with a wider meaning (No. 5/333).

Handaxes (Plates 19—29)

Handaxes are defined as symmetrical, pointed tools with sharp lateral edges. The range of large bifacial tools in the sample makes the limiting of the handaxe class desirable for adequate description. The limits of the handaxe class are arbitrarily set and there are intermediate forms between handaxes and other large bifacial tools. This is not simply a product of the latter being unfinished handaxes or rough-outs as they show features such as the absence of emphasis on the point which by definition excludes them from the handaxe class although they show ample evidence of having been used as tools. This subdivision cannot be taken to imply functional differences.

Malan (1939, p. 247), in relation to a sample of handaxes from near Wellington, considered the standardization of shape in handaxes made on cobbles was due to the selection of raw material and that the shape with the highest frequency, the pear-shape, was a product of this selection. The range in plan form at Amanzi is similarly limited and with flaking minimal in general, the cobble form of the raw material is a controlling factor. The common shape is the pear-shape or the long ovate to lanceolate form. Plate 24 illustrates the nearest approach to an ovate form and the cordiform is not represented. Cortex, frequently removed from only one face, controls the shape of the butt on many specimens.

The largest homogeneous sample of handaxes numbers 63 from Area 2 and the data for this sample are given as typical for this artefact class at the site. The handaxes show considerable variability in the primary measurements (length, breadth, thickness and weight). For example, length, measured as the longest axis of the tool, gives the following results in this sample:

SAMPLE OF 63 HANDAXES FROM AREA 2: MEASUREMENT OF LENGTH

Number	Range	Mean ($\bar{X}$)	Standard Deviation (s)	Coefficient of Variation ($V = \frac{100 s}{\bar{X}}$)
63	81—265 mm.	146 mm.	38 mm.	21·3 mm.

The length frequency distribution differs significantly from the normal and it is bimodal with peaks in the 111—120 mm. ($f = 13$) and 151—160 mm. ($f = 9$) length classes. Weight is another measure of size and the range in this sample is from 6·5—70 oz.

The frequently quoted index in the description of handaxe samples is the breadth-length index ($\frac{B}{L} \times 100$). This index is a simple measure of shape expressing it as a relative broadness or narrowness. It does not take into account thickness, weight, taper, pointedness or other features which make up the whole form of the tool. In a sample such as this from Amanzi,

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with a limited range in plan forms, the breadth-length index is a useful statistic. The frequency distribution approximates to normality ($P = 0.8-0.9$) and the coefficient of variation ($V = 11.75$) is lower than for either of the component measurements. The sample data are tabled below. The estimate of the mean at the 95% confidence level is between 58.7 and 62.2.

SAMPLE OF 63 HANDAXES FROM AREA 2: BREADTH-LENGTH INDEX

Index	Number	Mean ($\bar{X} \pm \text{s.e.}$)	Standard Deviation (s)	Coefficient of Variation (V)
$\frac{B}{L} \times 100$	63	60.4 ± 0.89	7.10	11.75

Mason (*op. cit.*, p. 221) gives the mean values of the breadth-length index of a series of handaxe samples of comparable size from six South African sites. The mean value for this index in the Amanzi sample falls midway in the range of values cited by Mason (Riverview Estates = 54, Cave of Hearths = 65).

Apart from variations in size and shape in the handaxe class there are other general characters of note. The flaking on many of the tools is minimal and is primary blocking out rather than trimming or shaping of the edges and point which are the functional parts of the tool. There are exceptions showing flat flaking and a high degree of refinement or finish. It is becoming increasingly evident that the assumptions cannot be made on the general refinement in a handaxe sample regarding its position in time (Leakey, M. D., quoted in Clark and Bishop, 1966). The points are variously acute or obtuse but not attenuated. This is partly a function of technique and a number of tools show a five flake pattern on the point. This indicates a more precise technique than Goodwin's analogy to sharpening a pencil (Goodwin, 1933). The type of point resulting depends on how far the pointing flakes run. The point flaking is done on both cobbles and half cobbles, but not on large flakes made into handaxes. Plate 19 shows the typical undersurface preparation and Plate 25 the three upper surface pointing flake scars on a finished tool. Quartzite is relatively brittle and this is shown in the number of broken handaxes and handaxe tips found. The trimming shown on the point of some handaxes (Plate 21) may indicate retouching of a snapped point rather than a design for a specialized function.

By definition, handaxes have sharp lateral edges, but this is difficult to measure. The edge trimming is variable as is the resulting fineness of this edge. As a whole the handaxes do not exhibit the same fine edge as large samples from Geelhoutboom (Albany Museum accession 2946) in a similar material. Damage on some handaxe edges, again a subjective observation, is heavy and suggests a wide range for the use of these tools.

Cortex is frequently on the butt of specimens, either over the whole butt or at the butt and extending down one face or surface. This again is in part a product of the technique and the raw material.

A high proportion of the handaxes are on cobbles or half cobbles and a lower proportion are on end-struck or side-struck flakes. The technique reflects not only in the points and the butt, but also in the thickness in cross-section, symmetry and other features and accounts for variation in the class. A technique evident at this site is the use of longitudinally split cobbles for biface manufacture (Plate 20). The tool is made in a different plane from that of the long axis of the split cobble and this allows the production of a tool symmetrical in minor section, keeled and with cortex on the butt and extending down half of one surface. This technique

is interesting in that it shows practical appreciation of solid geometry and also, in conjunction with point flaking, the repeated use of seemingly rigidly standardized procedures in tool making.

Cleavers (Plates 30–35)

This is a class of transverse-edged tools classified as in Mason (1962) and Kleindienst (1962). Numerically the class is poorly represented. There is some variation not only in plan form but also in the damage on the transverse edge. The cleavers in the Area 2 samples are not typical in that several show notching of the transverse edge (Plate 30 and 31) due to use and the other examples are heavy tools or show heavy damage on the transverse edge. These could be classified as transverse-edged tools rather than cleavers. From Area 1, more typical examples of parallelogram-trapezoid forms (defined as in Mason, *op. cit.*) were found and in addition two ultra-convergent cleavers (Kleindienst, *op. cit.*) came from Square 2 (Plate 35).

Other Bifaces (Plates 36–41)

The range of unstandardized tools made in the biface tradition have been grouped in this class. Some subdivision is possible on edge and point. With the possible exception of the few limande-shaped symmetrical, “round-bitted” bifaces, no formal tool types are included in this class. The heavy limande (Plate 36) with extensive trimming over both faces would seem to fall into the round-bitted biface sub-class of Kleindienst’s classification, but the frequency in the total sample is too low for recognizing these as separate from other elongated bifaces.

The class has been divided into 4 sub-classes: (1) Elongated bifaces (Plate 36, 38–40) include those tools lacking any emphasis on the point, but with trimming and not infrequently heavy damage on the lateral edge. In some instances the point has been modified by steep retouch. (2) Other pointed bifaces are a group showing no emphasis on the lateral edges (Plate 37). (3) Pointed cobbles shown the absence of lateral edge retouch and flaking is confined to the point. (4) Unpointed edge trimmed bifaces are included here although they lack the symmetry about the long axis, have a single edge trimmed and no point (Plate 41). These would be excluded in a more general description from the handaxe-like forms, but it is convenient to include them here. The accompanying table shows the frequency of these sub-classes in the Cutting 5–9 samples.

Notably rare are any pick-like forms. There are two tools from Surface 3 which could be included in the pick class as defined for the East African Acheulian and a further example was found in Cutting 1 during the 1963 excavation.

TABLE 4

FREQUENCY OF OTHER TOOLS AND OTHER LARGE BIFACES IN CUTTINGS 5–9

(a) OTHER TOOLS

Cutting	Stone Balls	Hammerstones	“Wedges”	“Adzes”
5	1	1	1	2
6	—	—	4	3
7	—	—	2	—
8	—	—	—	3
9	1	—	3	1
TOTALS	2	1	10	9

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(b) OTHER LARGE BIFACES

Cutting	Elongated Bifaces	Other Pointed Bifaces	Pointed Cobbles	Unpointed Edge Trimmed
5	9	6	—	9
6	9	5	1	5
7	1	1	—	—
8	4	4	—	—
9	2	1	1	4
TOTALS	25	17	2	18

Discs:

The frequency in the class is low in all samples, which has necessitated the grouping of this with another class in any analysis (*vide* Cores).

Other tools (Plates 42—43)

Again, for analysis purposes, it has been necessary to group in this class several tool types which are unimportant numerically, but may have typological importance. The frequencies in the samples from Cuttings 5—9 are given in the accompanying Table. The class includes: (1) Stone balls, typical small polyhedral stone balls which require little comment. (2) Hammerstones. The recognition of hammerstones is difficult on chatter-marked cobbles, but all natural stone was examined for signs of use. A single example in the Cutting 5 sample is in a hard, clear quartzite and the damage is clearly visible. Only two other hammerstones were recorded from the whole excavation. (3) Transverse-ended tools or “Wedges”: A series of tools with a wedge-shaped major section have been grouped in this sub-class. The frequency in the samples is too low to confirm whether this sub-group is a typological entity (Plate 42). The primary form is a flake and the edge is transverse being formed by the intersection of two flake surfaces, or cortex and a flake surface, as in a cleaver. Trimming, in some examples as steep as scraper retouch, extends around the transverse end and up one or both sides. The trimming distinguishes them from the cleaver form and they are best described as flat-based, high-backed, transverse edged tools. Apart from a single example in Cutting 10, all come from Cuttings 5—9. (4) Small edge-trimmed tools or “Adzes”: This is again a group which has doubtful validity because of low frequency. They are small bifacially trimmed tools with shallow trimming on one face and step flaking on the under surface (Plate 43). The trimming is not scraper retouch and in some examples is more adze-like. All examples from the excavation came from the samples tabled.

Flakes (Plates 44—51)

Flakes have been classified as large and small on the basis of the length of the longest axis (> 100 mm. and < 100 mm. respectively) and as modified (miscellaneous trimmed and scraper re-touched) and unmodified. Snapped flakes have been included in the counts, but flake fragments (< 10 mm.) have been classified as small irregular pieces. There is no apparent difference in the flake length frequencies for modified and unmodified flakes, except that larger flakes show a higher incidence of trimming. Tables 5 and 6 give details of size range and the trimming in typical samples.

On these figures it would not seem that there is any selection in size and the larger flakes form a “tail” in the length frequency distribution. This would seem to be against any assumption that the small and large flakes have specific functional differences (compare Kleindienst

op. cit.). The larger flakes in general are thicker and retouch is coarser and this may be an explanation for some variation in trimming on the flakes.

Trimming on the flakes is minimal in many examples and may amount to little more than utilization damage: in quartzite as stressed elsewhere, the recognition of trimming, where minimal, is difficult and makes for a possible source of error in classification. Where trimming is steep, this has been classed as scraper retouch. The flake scrapers are for the most part informal (compare Clark, 1954, p. 95) tools with the retouch along the longest axis (side scrapers). Scraper is used here as a descriptive term without any implication of function.

A range of flakes is illustrated showing characteristic shape, dorsal preparation and trimming (Plates 44—51).

TABLE 5

AREA 2

(a) FLAKE FREQUENCIES (SUB CLASSES)

Cutting	Large Flakes (100 mm.)			Small Flakes (100 mm.)		
	Misc. Trimmed	Scraper	Unmodified	Misc. Trimmed	Scraper	Unmodified
5	11	(undifferentiated)	2	41	20	53
6	11	8	—	32	28	43
7	—	—	—	2	4	1
8	4	4	—	9	20	18
9	7	2	2	10	8	34
Surface 2	4	6	—	23	65	106
Surface 3	14	20	2	9	30	65

(b) POSITION OF SCRAPER EDGE ON SMALL FLAKE SCRAPERS

Cutting	Side	Double Side	Side and End	End	Circular	Notching of Edge (all categories)
5	11	3	—	3	3	1
6	18	1	7	—	2	2
7	1	—	1	2	—	1
8	12	2	3	—	3	8
9	5	—	2	—	1	1
Surface 2	44	2	3	9	7	11
Surface 3	21	1	2	5	1	4
TOTAL	112	9	18	19	17	—

Miscellaneous Trimmed Pieces

This class includes those artefacts that show some trimming but do not fall into any one of the other classes. For the most part the trimming is on irregularly flaked pieces or chunks.

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TABLE 6
FLAKE LENGTH FREQUENCIES

Class (Length in mm.)	Area 1		Cutting 10		Area 2							
	Sample 1		Sample 2		Cutting 6		Cutting 8		Surface 2		Surface 3	
	A	B	A	B	A	B	A	B	A	B	A	B
10—19	—	—	1	—	—	—	—	—	—	—	—	—
20—29	1	1	9	2	5	3	—	—	3	—	2	—
30—39	12	5	28	1	14	7	6	4	11	3	9	1
40—49	15	8	26	8	13	15	4	4	18	15	10	3
50—59	6	5	31	8	8	15	3	5	11	7	11	5
60—69	2	3	17	3	2	9	3	8	6	7	7	5
70—79	1	3	11	5	1	7	2	4	6	7	3	5
80—89	—	3	2	4	—	3	—	2	—	5	2	4
90—99	1	2	4	3	—	1	—	—	—	2	—	5
100—109	—	1	—	4	—	4	—	1	1	—	—	8
110—119	—	—	—	3	—	4	—	3	—	—	1	6
120—129	1	1	2	2	—	2	—	3	—	1	—	6
130—139	—	—	—	2	—	1	—	—	—	—	—	1
140—149	—	2	1	1	—	1	—	—	—	1	—	1
150—159	—	—	—	—	—	—	—	—	—	1	—	—
160—169	1	—	—	2	—	4	—	—	—	—	—	—
170 plus	—	—	—	—	—	2	—	1	—	—	—	—
TOTAL MEASURED	40	34	132	48	43	78	18	35	56	49	45	50

A—untrimmed B—trimmed.

5. SAMPLING AND CONTEXT

At Amanzi the overburden covering the Acheulian artefact occurrences is everywhere in excess of several feet and thus in each instance the cuttings were initially exploratory. With the exception of some pits (Fig. 3) all cuttings were located within two spring depressions and no Acheulian horizons are known associated with hill slope deposits. In view of obvious local disturbance within the deposits, samples of artefacts drawn from different parts of the depressions do not have equal value for interpretation. In the absence of evidence of hearths or structures, areas of occupation can only be defined in terms of areas of intense activity reflected by high density artefact scatters. As high density scatters could result from concentration through transport in a wholly geological context it is important to distinguish samples in primary or semi-primary archaeological contexts from those including in the main derived and possibly selectively sorted material. It is perhaps to be expected that any main occupation areas would lie on the margins of the springs within or outside the depressions. However, some activities may have resulted in artefact scatters extending to the central portions of the spring. Here foci such as the spring vent in Area 2 may have been of import. Again it is unlikely that within an environment such as a spring depression artefact occurrences will be interpretable in terms of simple discrete occupations.

Acheulian cultural material in the youngest deposits is clearly derived as evidenced by the concentrations within erosion irregularities. This is best seen in Cuttings 1 and 10 of Area 1. The artefacts occur at the base of the pothole fill and some concentrations appear to fit what has been described elsewhere as “swarms” (Caton-Thompson, 1952). The context here is wholly disturbed and selective sorting evident to some degree.

In Area 2 there has been a measure of disturbance and selective sorting on the steep sloping Surfaces 2 and 3 within the white sand body forming the central portion of the depression. To a lesser degree this is again the case in the sample designated as from Surface 1. The Surface 3 sample (Plate 10) includes a high proportion of natural stone in the cobble grade and the occurrence was analogous to a cobble pavement in appearance. The Surface 2 sample again shows a high frequency of natural stone but in the pebble grade and in the Surface 1 sample there is a marked reduction in the relative proportion of natural stone to the total frequency of artefacts plus natural stone.

TABLE 7

	% Natural Stone	Pebble Grade 64 mm.	Cobble Grade 64 mm.
Surface 1	44%	36%	18%
Surface 2	75%	61%	14%
Surface 3	67%	32%	35%

The different grades of natural stone in the Surface 2 and 3 samples is evidence of selective sorting or differential transport and the anomalously high proportion of natural stone in these samples indicates the disturbed context.

The Surface 1 sample (Cuttings 6, 7, 8 and 9) was derived from the sand surface and the base of the brown humic sands immediately overlying it. There are a number of small irregularities on the surface of Cutting 6. There is some concentration of cultural material in these irregularities and around the vent (Fig. 20) with the result that in the total sample selective sorting of larger and smaller artefacts is not pronounced. The composition of the Surface 1 sample is not significantly different from the Cutting 5 sample from the margin of the depression and more plausibly in a semi-primary archaeological context (χ^2 test $P = 0.8-0.9$; 10×2 contingency table based on Figs. 18—19). The scatter on Surface 1 could be traced as continuous with that in Cutting 5 in the excavation and is in part or wholly contemporary. On the excavated exposures it could not be determined whether Surfaces 2 and 3 were also an extension of the Cutting 5 occurrence but this appears possible (Fig. 13). The distribution of large tools in Cutting 6 (Surface 1) was examined to test whether any groupings of these tools could reflect direct evidence of activities in the central portions of the spring. This proved negative and the observed frequencies show a close correspondence to the expected frequencies, calculated from the Poisson probabilities. The data for the handaxe sample are given as an example (*vide* Fig. 20).

TABLE 8

Number of handaxes per 2' x 2' square	0	1	2	3 and over
Observed frequency	15	9	6	0
Expected frequency (Poisson distribution)	15	10.5	3.6	0.9
Poisson's probabilities	0.50	0.33	0.12	0.03

There is a limit to the artefact distribution on Surface 1 seen in the decrease in finds in Cutting 7. This probably finds an explanation in the distribution of a clayey facies, the marginal clays on this side of the depression. There is some basis on this distributional limit to exclude the possibility of the cultural material in the Surface 1 sample being derived from outside the depression. The cultural material from Surfaces 1—3 is thus considered to be from disturbed

archaeological contexts. The selective sorting evident in the samples from Surfaces 2 and 3, however, is less pronounced in the Surface 1 sample, which is comparable in composition to the sample from Cutting 5.

The Cutting 10 sample from Area 1 and the Cutting 5 sample from Area 2 are drawn from occurrences of similar form. Acheulian artefacts occur as a dispersed accumulation through a thickness of some 4 feet in Cutting 10 and 2 feet in Cutting 5. In the latter, a limited exposure 20' by 6' and cut by a modern furrow, the density of finds was uniformly high. In Cutting 10 it is evident that there is variation in the density of finds in both the vertical and horizontal dimension. Occurring in the base of the grey black silt sub-unit and extending into the underlying deposits there is no clear basis for partitioning these samples. This mode of occurrence as vertically dispersed artefact accumulations, is more difficult to interpret than an occurrence of single tool thickness on a coherent temporary land surface. Two factors that are not mutually exclusive are involved in the vertical distribution of artefacts in the Cutting 10 and 5 occurrences; these are settling and time. In Cutting 10 there is a general vertical fall off in the density of finds as measured by weight in the sampled blocks (Fig. 16) which strongly suggests settling as a major factor. Again the ratio of large (>100 mm.) to small artefacts is higher in the top 1' 6" of the Cutting 10 accumulation than in the underlying 2' 6" of the zone sampled. This evidence in addition to varying attitudes of elongated tools found in the deposit supports the contention that some measure of settling has taken place.

Evidence that a time factor is involved in addition to settling is given for example by the occurrence of three large cleavers in one sample block of Cutting 10 (0' = 6'/0'—5') at a depth of 10' 6" below datum (Fig. 16). On probabilistic grounds, in Area 1 where the frequency of cleavers is low, this association in isolation can be regarded as significant and indicative of primary context. Mention has been made of a similar grouping of this type in Square 2, but related to a surface on the white sands towards the center of the spring. More direct evidence that time is involved in these vertically dispersed accumulations, is provided by the limited sample of cultural material found below the impersistent upper clay band in Cutting 1.

The horizontal variation in the artefact density in Cutting 10 (Area 1) is shown by an abrupt increase in artefacts in the upper 18" of the artefact accumulation in sample block 10'—15'/30'—35' (Figs. 15 and 16). There is a two-fold increase in the density of artefacts per unit volume of deposit in this section and the denser scatter traced for some feet is not localized or related to any line of erosion or wash. For analysis this portion of the Cutting 10 sample has been designated as Sample 1. Samples 2 and 3 from Cutting 10 have been arbitrarily defined as the upper 18" and lower 30" of the artefact zone in the rest of the area of the Cutting (Fig. 15). Although Samples 1 and 2 are directly comparable, Sample 3 in view of the effect of settling is perhaps of more limited interest. The Cutting 5 sample (Area 2) has been considered here as a single unit. In future investigations at the site, extensions to the eastern portion of Cutting 10 and Cutting 5 will deserve consideration.

The quantity of natural stone in the samples from the Surfaces 1—3 in Area 2 has been used as a measure of disturbance. In Cutting 5 Area 2, the percentage is comparable to that on Surface 1, i.e. between 40 and 50%. This figure is reduced to below 40% in the Cutting 10 samples in Area 1. There is some variation in the grade of natural stone and noteworthy is the high proportion of stone in the cobble grade in Sample 1 of Cutting 10 (Fig. 17). This could be explained by selection and concentration of material in a more usable size range in this locality. The occurrence of natural stone in the deposits is in itself interesting as it is associated with the artefact occurrences and is outside the grade of normal sediments deposited by the springs. Cobbles and pebbles are not found randomly dispersed throughout the spring deposits. The ultimate source of much of this material is probably local, possibly a remnant of terrace gravel on the hill flank. On the present evidence, it appears unlikely that all the natural stone and likewise the artefacts, have been derived from the spring surrounds by hillwash and accumu-

lation on temporary stable surfaces within the depressions. However such an explanation is possible for unworked stone in the smaller pebble grade.

Inskeep (*op. cit.*) classified the Cutting 1 sample of cultural material on varying degrees of abrasion which would seem to suggest transport. However, this sample included artefacts from the post-unconformity member which has suffered disturbance. Any measure of sharpness or dullness of artefact edges is difficult to apply as differential weathering related to the shistosity and felspathic composition of some quartzites is involved in addition to any physical effects due to abrasion. In the sample as a whole the supposed effects of "abrasion" are not high.

The occurrence of typologically foreign elements in the Acheulian samples is a result of natural conditions peculiar to the site and outside the control of sampling. The recognition of such artefacts lies in that they fall outside the range of variation in equivalent classes in the main sample and they exhibit different techniques of manufacture. The two micro cores mentioned by Inskeep (*op. cit.*) are examples. In the Cutting 10 sample there are similar small silcrete elements, one triangular point and several fragments of snapped triangular or long quadrilateral flakes with dorsal surface preparation atypical of the rest of the flake sample. These "intrusives" are in the top of the accumulation and are not dispersed throughout. In Area 2 on Surface 1 and Cutting 5, the artefacts considered to be intrusives are illustrated in Plate 52. The proportion of such apparently foreign elements is too small to bias the sampling. Their occurrence demonstrates the poor seal the grey black silt bed provided at a stage prior to the humification of organic material in this bed and its truncation as a compact horizon by the erosional unconformity.

6. ANALYSIS

The excavations at the two spring depressions, although adjacent, are in effect at two sites. Each relates to a different occupation or series of occupations which may be broadly contemporary. The ridge separating the depressions is mantled by spring deposits or soil but is presumed to overlie a dividing spur of Cretaceous rock. The object of this analysis is to examine the class frequency data given in the accompanying bar charts. In this the chi squared statistic has been used as a significance test between samples. The power of the test is reduced in some applications by the number of variables considered. Again there is some loss of information in the grouping of the frequencies in certain classes to fit the requirements of this test.

Area 1

Samples 1 and 2 from Cutting 10 are directly comparable as they represent different portions of the upper section of a continuous artefact zone. A major difference lies in there being a two-fold increase in the number of finds per unit volume of deposit in Sample 1 relative to Sample 2. The well marked limit to the Sample 1 scatter suggests that this may represent a distinct occurrence. The samples include the same range of artefacts; however, there is a significant difference ($P = .001$) in the relative frequencies of artefacts in the different classes (a 9×2 table based on Fig. 17). The overall difference at a general level is an increase in the large elements (natural cobbles, flaked cobbles, anvils and cores and large bifaces) and a decrease in untrimmed or unmodified flakes in Sample 1 relative to Sample 2. The frequencies of small (< 100 mm.) trimmed and untrimmed flakes was tested in a 2×2 contingency table and found to be significantly different at the 1% level for the two samples. The archaeological inference drawn from these observations is that the spatial pattern in the distribution of artefacts in Area 1 would appear to be the result of activities attendant on occupation rather than the result of selective sorting by geological agencies. The eastern or Sample 1 portion of Cutting 10 cannot be considered to be a simple extension of the artefact

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scatter represented by Sample 2. The value of extending Cutting 10 to the east in future exploration of the site is apparent.

Area 2

As noted, the artefact class frequencies in the samples from Cutting 5 and Surface 1 were not significantly different. Although the Surface 1 occurrence offered the possibility of partitioning this sample, the obviously partly disturbed context of the material did not warrant this. The combined samples from Cutting 5 and Surface 1 present the largest single sample unit from the springs for typological comparisons. In Area 2 in the fall off in artefact density towards Cutting 7 on Surface 1 there is a distributional limit which may in part be culturally determined. The occupation of the Area 2 depression is more clearly multiple as evidenced by the horizons excavated below Surface 1. The samples from Surfaces 2 and 3 have not been compared with those from Surface 1 and Cutting 5 as the former are biased due to selective sorting by natural agencies.

Areas 1 and 2

The two areas excavated have provided artefact samples classified within the Acheulian complex. There are some tool sub-classes of possible typological significance found only in Area 2, but these have low frequencies even in this larger sample. There are differences between the combined samples from each depression in the relative proportions of trimmed and untrimmed flakes and in the incidence of cleavers to handaxes and other large bifaces (χ^2 test; $P = .001$), (data given below).

	Cleavers	Handaxes and large bifaces	Total
Area 1	12	59	71
Area 2	8	196	204
TOTAL	20	255	275

The cleavers from Area 2 are atypical in showing heavily damaged transverse edges or notching in this edge. At a purely subjective level the biface element from Area 2 is heavier and edge damage more marked. Although other differences exist and are not brought out by this analysis, the broad range of activities in as far as they are indicated by the lithic samples, would appear to have been essentially similar.

7. DATING

On the basis of their geological setting the spring deposits can be dated to the Pleistocene and the phase of river incision that has resulted in the modern Coega valley. The considerable volume of deposits suggests a long period of spring activity even if the deposits form a somewhat patchier cover on the hill flank than the few bore-hole sections indicate. Estimates of the age of two other spring complexes, Caledon at 300,000 years and Warmwaterberg at 850,000 years (Kent, 1950, p. 247) based on calculations of the rate of build up of iron precipitates by the spring waters, are indicative of the order of age of some spring deposits. This method of dating, however, is incapable of great accuracy or refinement. Although some members of the Amanzi Springs Formation may be of greater age, the deposits in the excavated areas near the Edwards bore-hole appear on the included cultural material to date to the Middle-Upper Pleistocene.

Following the 1963 excavation, a sample of wood from the natural drift accumulation in Cutting 1 was submitted to the Groningen Laboratory for radiocarbon dating. The apparent age $60,600 \pm 1,100$ years B.P. (GrN—4407 and 4546; Vogel and Waterbolk, 1967) is a *terminus post quem* for the main artefact occurrence higher in the sequence. The stratigraphic position of the sample is fixed in relation to the two dark clay bands exposed in Cutting 1. No cultural material was found in the Cutting 1 extension below the surface on which the wood had accumulated. Two further wood samples from the Rietheuvel Member had been dated. They include a sample from Area 1 Square 1 from a stratigraphic position in the brown humic sands below that of clay markers in Cutting 1 (SR—103: $32,900 \pm 600$ years B.P.) and a sample from Area 2 Cutting 6 from close to the edge of the spring vent and on Surface 1 (SR—107: $38,100 \pm 2,000/1,600$ years B.P.). The apparent age of these samples is lower than the expected age and neither was given any specific pretreatment. The dating of these two samples is of the same order as the result for a single sample from the Balmoral Member. While the stratigraphic position of the samples is not in doubt, it is tempting to see in this correspondence a relationship to some common factor possibly relating to the second phase of spring activity. The two dates SR—103 and 107 must be considered minimum dates for the Acheulian occupation.

The dating of the Balmoral Member rests on the age determined for a wood fragment from Cutting 10, Area 1. This result (I—2241: $31,000 \pm 1,200/1,100$ years B.P.) is not in conflict with other dating evidence. The wood occurred one foot above the unconformable surface in the frontal section of Cutting 10 (co-ordinates 15/15 Fig. 15) shrunk within an isolated cavity.

8. SPRINGS AS ARCHAEOLOGICAL SITES

The Amanzi Springs in themselves are of interest as a number of similar deposits have been excavated elsewhere in southern Africa and farther afield. Possibly the best known and the best published excavation of this type of deposit is the study of the Kharga Mound Springs, United Arab Republic (Caton-Thompson, 1952). The Florisbad Springs, in the Orange Free State, have been the subject of investigation by a number of workers (Dreyer, 1938; Meiring, 1966) between 1930 and 1952 and a more recent example of archaeological interest in spring deposits is the papers that have appeared on the Gwisho Springs, on the margin the Kafue Flats in Zambia (Fagan and van Noten, 1966; Gabel, 1965; Van Noten, 1965). There are some structural and depositional features at these sites mentioned which find parallels at the Amanzi Springs.

As a result of the scarcity of surface waters over much of South Africa, springs played an important part in the historic settlement pattern prior to the advent of the drilling machine. Spring localities appear to have had an equally important role in prehistoric times and they are features at which conscious archaeological search can be directed. The unusual conditions for preservation at some sites may offset the limitations imposed by the complexity of the depositional processes operating in such environments. Again in South Africa where uplift and peneplanation have been the dominant processes operating throughout the Quaternary, spring deposits are an important class of deposit of potential archaeological interest in that they may include sealed artefact occurrences. Large numbers of springs are known in the dolomite areas of the Transvaal, northern Cape and South West Africa and may be associated with the build up of calcareous tufa deposits. Plant impressions are known from tufa deposits (e.g. Windhoek Springs) and the Taung find site is an example of an archaeological site associated with tufa deposits. Of more interest here are spring deposits formed by mechanical sorting of suspended solids derived at depth and from the re-working of the bed rock. These give rise to typical mound springs. Artesian areas are rare in South Africa and most springs are fed by re-cycled meteoric waters held in fissure or fracture zones in rocks of low porosity; the location of the springs being fixed by structural controls such as dykes or faults.

Interest has thus far centered on the composition of spring waters (Rundl, 1915, quoted in Hall, 1938) and the occurrence of thermal springs (Kent, 1950). Deposits other than chemical precipitates have received little attention although relatively considerable thicknesses have been built up at some localities. The thickness of the spring deposits at Amanzi (22 feet, 6·8 metres) is matched by the known thickness of deposits at Florisbad (21·5 feet, 6·8 metres, Oakley, 1954; Meiring, 1956) and the springs at Aliwal North (over 10 metres, more than 30 feet; Coetzee, 1968). Cultural and faunal material have been recovered from the Cradock Springs and they are of possible interest although the thickness of the associated deposits is unknown. Springs issuing from physically and chemically resistant rocks such as the quartzites of the Cape System may be associated with little build up of spring deposits as at the Uitenhage Springs although iron-manganese sinters, at Caledon for example, are formed by a number of springs in rocks of this system (Kent, 1950). Reliable information on the aerial extent and thickness of deposits associated with the majority of spring occurrences in South Africa is lacking. While many factors are involved, as a guide to conscious search, three of the spring deposits noted above occur in the Beaufort Series of the Karroo System (Aliwal North, Florisbad and Cradock). Selection could be directed at thermal springs as these may be associated with larger scale geological structures and the flow may be less dependent on minor fluctuation in the reservoir intake. The dating of the deposits, where known, ranges from Upper Pleistocene (Amanzi), Upper Pleistocene—Recent (Florisbad, Meiring, 1956; van Zinderen Bakker *in* Bishop and Clarke, 1967, p. 133) to post Pleistocene (Aliwal North, Coetzee, 1968). Outside South Africa, numbers of springs are known in Rhodesia associated with post-Karoo faulting (du Toit, 1939) but have yet to receive archaeological attention and in Zambia in addition to the Gwisho springs, a fairly extensive spring deposit with associated cultural material has been reported from near Chingola (Sampson, 1965).

The mound springs at Kharga Oasis occupy spring eroded hollows in Cretaceous clays and are fed by artesian waters. The springs for the most part form discrete, strongly linear clusters of vents and the associated deposits may extend over a distance upwards of one kilometre (0·6 miles) (Caton-Thompson, 1952, Fig. 7). The sorting action of the waters has produced typical sand cores to the springs and associated finer sediments. The vent structure at KO 8A (*op. cit.* Fig. 14) is the type of structure excavated in Cutting 6 Area 2 at Amanzi. The nature of the contact between the white sands and overlying green clays, the segregation of clays within the sands and stringers of sand in the overlying clays at KO 10 and again the disconformity apparent in the KO 6N trench face (*op. cit.* Plate 6 No. 1 and 4 respectively) are strongly reminiscent of features in the Amanzi deposits. The Acheulian handaxe clusters (*op. cit.* Plate 6 No. 2) resemble the mode of occurrence of cultural material in the base of the pothole fill in Cutting 1 Area 1 at Amanzi and it is tentatively suggested that a cultural explanation is not demanded for the occurrence of such swarms. The organic material reported from the Kharga site includes plant stems, seeds and as at KO 5B bands of organic rich sediments (*op. cit.* pp. 84, 153). Plant material described as carbonized probably represents de-humified organic material. In such spring environments only the skeletal structure of the plant remains is preserved. The macro and micro plant fossils at the Kharga springs may repay further study.

The Florisbad Springs are best known for the find of a human skull in the lower layers of the deposit. A dolerite dyke exposed in the base of the 1930–2 excavations appears to be the structural control for the spring occurrence and the two lines of vents (Oakley, 1954; van Zinderen Bakker, 1957) may lie on either side of this barrier. The linear arrangement of vents is a reflection of the migration of vent outlets eastwards in the complex (Dreyer, 1938; Oakley, 1954). Piaget (*in* van Zinderen Bakker, 1966) has described the grading of the spring deposits as due to the elutriation effect of the rising waters and a succession of sand and dark organic clayey layers (van Zinderen Bakker, 1957), the latter termed Peats I–IV by Dreyer (1938), is recognized in the main section excavated. Several vent structures and minor

upshoots of sands have been noted in the deposits (Dreyer, 1938) and that disconformities in the sequence may be represented by erosional features at the top of successive dark organic layers, has been suggested by van Zinderen Bakker (1957, p. 59). Present dating evidence is somewhat unsatisfactory as a base against which to interpret the discontinuous pollen spectrum from the site. A major time break has been suggested between the lower (Peat I) and upper parts (Peats II—IV) of the deposit (van Zinderen Bakker, 1967) on the basis of available radiocarbon determinations and this requires confirmation from field studies. If confirmed, the time break would be of the same order as that recognized between the deposition of the Rietheuvel and Balmoral Members at Amanzi. It can be argued that the high counts of Chenopodiaceae, Cyperaceae and Zygophyllum in the pollen profile represent vegetation stabilized at the springs during periods of diminishing activity and not "wetter spring cycles" (van Zinderen Bakker, 1957, Fig. 2). This would reduce the apparent correspondence between cycles of spring activity and warm dry regional climatic conditions inferred from the relative percentages of Compositae and Gramineae. Rapid sedimentation and flush flow conditions appear more clearly evidenced in the apparently coarser facies in which stems of drowned plant communities have been preserved in their context (Dreyer, 1938) and in which, incidentally, the pollen counts are low. In the general structure of the Florisbad deposit, however, there are many features that parallel those described from Amanzi and Kharga. Emphasis in excavation has been placed on the apparently richer accumulation of fauna and artefacts in vent structures where from considerations of context, the results are least likely to be meaningful. Areas marginal to such structures may prove more productive in yields of demonstrably associated cultural and faunal samples. For the present no adequate description of the cultural, faunal or macroscopic plant remains from the site exists.

Some published information is available on two of the three Gwisho Spring Mounds. Gwisho A and Gwisho B are about a quarter of a mile apart and each mound is some 120 feet (40 m.) across and seven to eight feet high. The outlets of these thermal springs are at present on the margins of the mounds. No detailed description of the lithology exists for either site and the suggestion that the Gwisho A mound represents an accumulation of wind blown alluvium (Gabel, 1965, p. 26) is unsupported. Vent structures termed spring eyes or spring heads are recorded at both mounds and they are apparently true mound springs. The dating of the Gwisho B site, $4,785 \pm 70$ years B.P. (GrN—4307) for the lower levels and $3,660 \pm 70$ years B.P. (GrN—4305) (Fagan and van Noten, 1966) is in close agreement with the dating of the Gwisho A site (Gabel, 1965) and the mounds are post-Pleistocene in age. Archaeological interest in this group of springs centers on the occurrence of numbers of burials in the mounds, wood and lithic artefacts of the local expression of the Wilton complex. The associated faunal and plant remains are a potentially important source of information on the ecology of the spring dwellers.

9. DISCUSSION OF BOTANICAL REMAINS

The preservation of plant remains at the Amanzi site is the result of the damp and acid conditions prevailing there. Soil samples tested show pH values from 5.5 to less than 4.0. These values are somewhat lower than that of the bore-hole waters which have a pH of less than 7.0. Conditions for preservation are not uniformly good over the whole site and even where most favourable only the more durable elements have survived. The partial drying out and the oxidation of the upper part of the deposits, accelerated in modern times by bore-holes lowering the water-table, is a major factor that has controlled the degree of preservation.

Macroscopic Plant Remains

Wood is preserved in the Rietheuvel Member and most of the finds are from Area 1. The wood appears to represent natural accumulations and the source would have been woody

plants growing in the immediate spring surrounds. It is typically black in colour and it is assumed that of the original composition only the lignin of the cell walls has been preserved. The Forest Research Institute undertook to section a limited number of samples (18 specimens) and for comparison 23 species (collection MJW 3160—83, Albany Museum Herbarium) of woody plants growing at the present day on the north flank of the hill were sectioned. The wood from the deposits was sectioned after impregnation with celloidin. No positive identifications resulted from this work and a limiting factor to eventual identification is the detail of the cell structure preserved. In this condition there is considerable variation but at least some sections are potentially identifiable. There is no key to the identification of commercially unimportant indigenous woody plants in South Africa. At this stage the only conclusions that can be made are that the local forest species such as *Podocarpus* and *Widringtonia* are absent in the small sample sectioned, as is *Acacia karroo*.

Seed and thorns were found in the brown humic sands in Area 1 and again seeds were recovered from the equivalent horizon in Area 2. These were isolated chance finds made by the breaking up of blocks of deposit and the quantities recovered are small. In the layered sediments of the Balmoral Member in Area 1 a number of leaves were found representing several morphologically distinct types. The sample represents leaf fall along one margin of the Area 1 depression during the deposition of the post-unconformity sediments. It has not proved possible to identify the principle component of the fringing vegetation of the springs represented by the branching stems buried in the deposits. A fuller description of these remains is given in Wells (1970).

The check list of woody plants collected from the immediate surrounds of the springs by M. J. Wells of the Botanical Research Institute and sectioned by the Forest Research Institute is given here.

MJW 3160 <i>Rhus longispina</i> E.+Z.	MJW 3173 <i>Schotia afra</i> (L.) Bodin.
3161 <i>Pappea capensis</i> E.+Z.	3174 <i>Cassine sphaerophylla</i> O. Ktze.
3162 <i>Maerua caffra</i> (DC) Pax.	3175 <i>Olea africana</i> Mill.
3163 <i>Scutia myrtina</i> (Burm. F.) Kurz.	3176 <i>Sideroxylon inerme</i> L.
3165 <i>Hippobromus pauciflorus</i> (L.f.) Radlk.	3177 <i>Aloe africana</i> Mill.
3166 <i>Acacia karroo</i> Hayne.	3178 <i>Scolopia zeyheri</i> (Nees apud E.+Z.) Harv.
3167 <i>Ptaeroxylon obliquum</i> (Thunb.) Radlk.	3179 <i>Portulacaria afra</i> Jacq.
3168 <i>Grewia occidentalis</i> L.	3180 <i>Lycium campanulatum</i> E. Mey.
3169 <i>Pterocephalus tricuspidatus</i> Sond.	3181 <i>Capparis citrifolia</i> Lam.
3170 <i>Azima tetracantha</i> Lam.	3182 <i>Diospyros simii</i> (O. Ktze.) De Winter.
3172 <i>Euclea undulata</i> Thunb.	3183 <i>Allophylus decipiens</i> (Arn.) Radlk.

Pollens

A series of samples taken from the west wall of Cutting 1 in 1963 were studied by Seagrief (Inskeep, 1965) and pollens of Cyperaceae, Gramineae, Compositae and Leguminosae were identified in these samples. Subsequently further samples have been collected from the site for pollen analysis and the study of these is in progress. Pollens are not preserved in the upper deposits where oxidized and counts are low in the sandy facies. Samples from clayey partings in the brown humic sands and the grey black silts show relatively high counts. Bacterial attack is evident on some grains. Pollens of waters-edge plants dominate the counts in samples examined with sedges showing high frequencies in addition to fern spores. Counts of arboreal pollens are low although Compositae (a number of morphologically distinct groups) and Gramineae are well represented.

10. GENERAL DISCUSSION

This report is intended as a statement on the present understanding of the Amanzi Springs Acheulian occurrences. Firm conclusions on the occupants and the occupation at

this stage are few in spite of fairly extensive excavations. The full potential of information to be gained from the site has yet to be realized, more data from the 1964–66 excavations are available than discussed here, and some aspects of the investigation such as the studies of the pollen profiles sampled and the detailed lithology of the deposits for example, have still to be completed. Again from the consideration of artefact sample size further excavation at the site would seem warranted notably in the extension of Cuttings 5 and 10. This would allow more extensive analysis and better definition of the Acheulian represented at the site than presented here.

At present there is little direct evidence for the general ecological setting in which the Acheulian occupation took place. The suggestion that the vegetation was more mesic than at present requires confirmation (Wells, 1970). An obvious attraction of the site to Acheulian groups was the spring waters issuing from a vantage point overlooking the Coega Valley and the site is close to a large salt pan. The number of discrete artefact occurrences associated with the springs points to multiple occupations over a time period. Other Acheulian occurrences are known from the Coega and adjacent valleys including the Sundays River sites (Ruddock, 1957) and in an upland area near Groendal Dam (E. Speed pers. comm.) however these are undated surface sites and are not necessarily the temporal equivalent of the Amanzi occurrences.

There is evidence supporting occupation within the two spring depressions investigated and the micro-environment presented by these is of consequent interest. Both Area 1 and Area 2 are open ended depressions with drainage outlets directed down slope. In this they differ from the circular ironstone rimmed depression adjacent to the Edwards bore-hole which has no natural directional outlet. At the latter the sunken area clearly corresponds to the extent of a former spring pool. In Area 1 the plant remains representing a fringing aquatic community and the accumulation of drift wood mark the position of a sometime spring pool over the domed white sand body in the centre of the depression. The extent of such a pool would have been dependent on the height of the outlet and subject to fluctuation in this unstable environment. Occupation indicated by denser artefact scatters appears to have been marginal to such a pool. A change in the transporting power of the spring discharge is evidenced in the grading analyses of the deposits (Table 2) at a stage which corresponds to the termination of the Acheulian occupation within the depression. At the onset of conditions leading to the deposition of the grey black silts, effective drainage of the depression was apparently not maintained and suitable surfaces for occupation no longer existed. In Area 2 there is less evidence of the position of any spring pool during the period of occupation although such may have existed in close relation to the sub-outcrop of the white sand body, central to the depression. Possibly the advantage offered by the location of occupation areas within the depression was protection from high winds which funnel up the valley in an otherwise exposed locality.

The spring deposits in themselves have proved of interest not in the least because there are structural and sedimentological features to which parallels can be drawn at other mound spring occurrences of archaeological or palaeoecological import. Within the Amanzi Springs Formation, three members are recognized, the Enqhura Member, the Rietheuvel Member and the Balmoral Member. It has proved necessary to restrict the term Rietheuvel Member to the two sub-units comprising the main artefact horizon, the grey black silts and the underlying brown sands as the results of further sedimentological studies (Butzer, pers. comm.) have indicated that these sub-units are lithologically distinct from the basal sediments.

The Pleistocene dating of the spring deposits expected on the grounds of the included cultural material, is confirmed by the radiocarbon dates available. The age determined for a sample of wood (GrN—4407 and 4546) from the wood rich zone in Cutting 1 by an enrichment process is considered a minimum age for the sample (Vogel and Waterbolk, 1967). This dating refers to the base of the artefact zone and some cultural material is of equivalent age as evidenced for example by the single flake found on the same surface as the wood in Cutting 1

extension and sealed between the two clay marker bands in the Rietheuvel Member. The apparent age of the Balmoral Member (I—2241) again falls within the Upper Pleistocene.

The Acheulian phase represented at Amanzi is characterized by the relatively heavy and unstandardized form of the artefacts. It is this variability in the attributes of formal tools that suggests the whole is a late or terminal Acheulian. There is a dearth of adequately described or dated Acheulian sites in the eastern Cape region. One of the most prolific sites is that at Geelhoutboom (24° 23' E.; 34° 7' S.) where the artefacts lie in a series of deflation platforms in a ferruginized dune area on the outer edge of a truncated marine peneplain some 700 feet above the Tsitsikama coast (Laidler, 1947). Exposure may represent partial and relatively recent destruction of the vegetation cover in the area and the artefacts are not appreciably weathered. Later cultural material is found in some deflated portions of the site and no *in situ* horizons have been recorded of Acheulian or later material. The range of Acheulian artefacts in quartzite shows a high degree of finish in contrast to the Amanzi finds and this site may represent an earlier mature expression of the local Acheulian. The well illustrated report on the Wagenmakers Vallei sites (Malan, 1939) indicates that occurrences with some typological similarities to the Amanzi site may be isolated within the Cape Folded Belt to the west. The dating, typology and the cultural status of what has been termed the Natal Sangoan are not well known and further investigation of the Natal occurrences would be of considerable interest to South African archaeology. A limited selective sample from a Tugela Valley occurrence (Albany Museum Accession No. 66/1) available for comparison shows an emphasis on pick forms that contrasts strongly with the Amanzi samples.

It is premature to attempt wider correlations at this time when it is impossible to relate the Acheulian sites in the same and adjacent valleys on the data available. No broad picture of the development of the handaxe culture in South Africa exists outside the Transvaal where, as elsewhere in southern Africa, it is proving difficult to demonstrate the temporal relationships of these early sites. The Amanzi occurrences form part of the Acheulian cultural development and our understanding of them will become clearer with the general advance in studies of this cultural period in South Africa.

ACKNOWLEDGEMENTS

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DEACON: THE ACHEULIAN OCCUPATION AT AMANZI SPRINGS

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LOCATION OF AMANZI SPRINGS

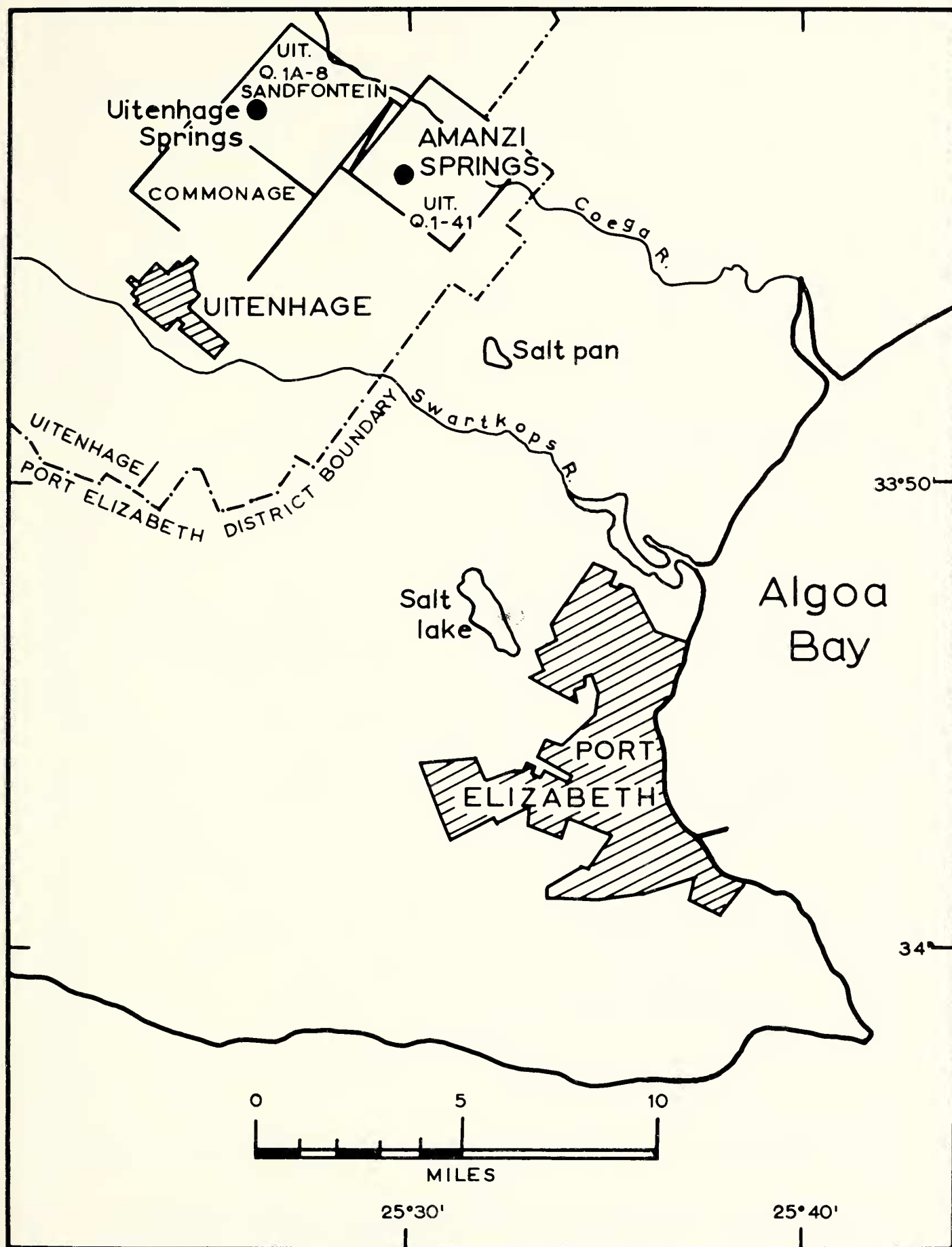


Fig. 1.

AMANZI HILL

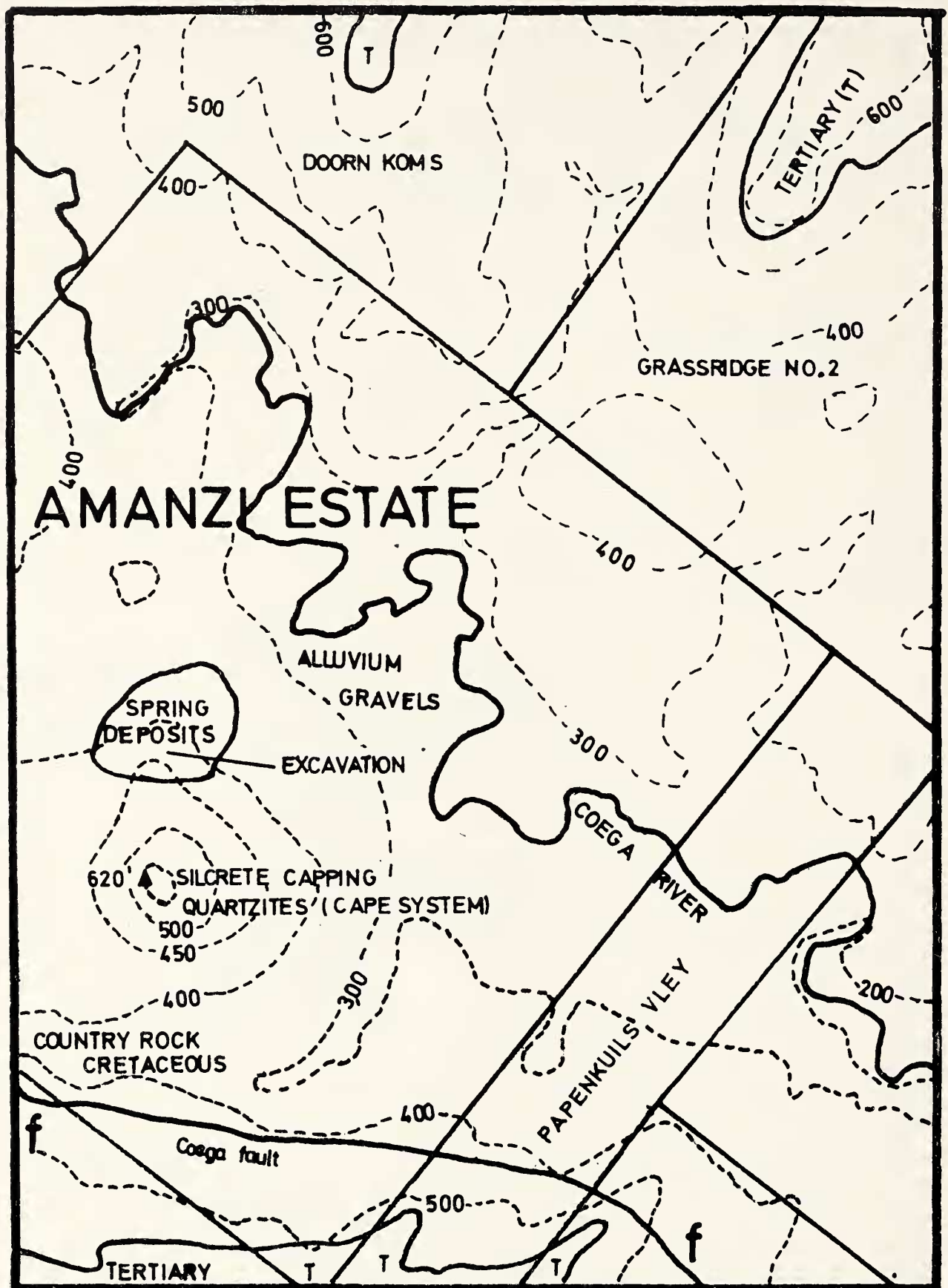


Fig. 2.

AMANZI HILL . NORTH FLANK

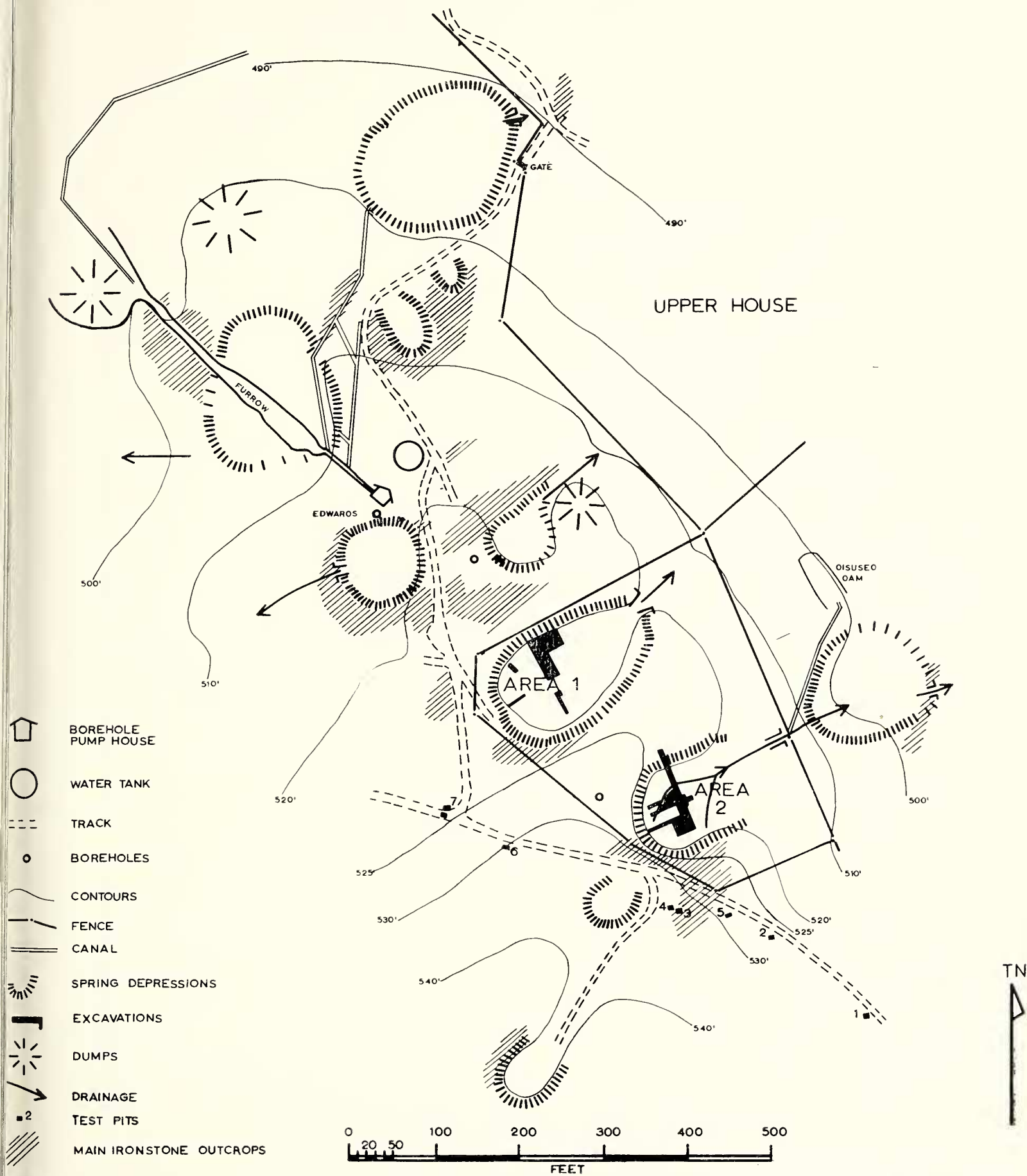


Fig. 3.

AMANZI : AREA 1
Plan of Cuttings 1 and 10-13

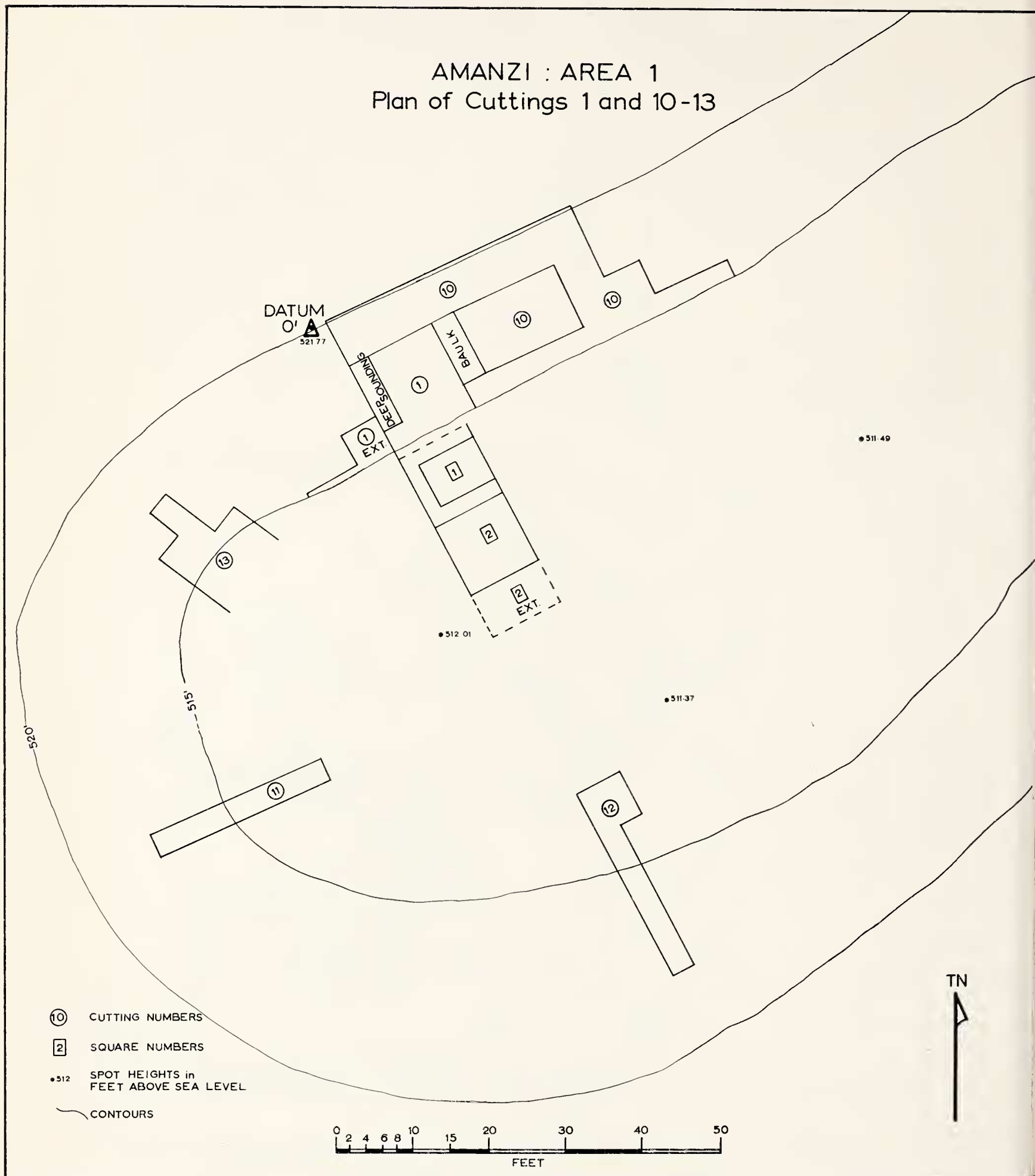


Fig. 4.

AMANZI : AREA 2
Plan of Cuttings 3-9

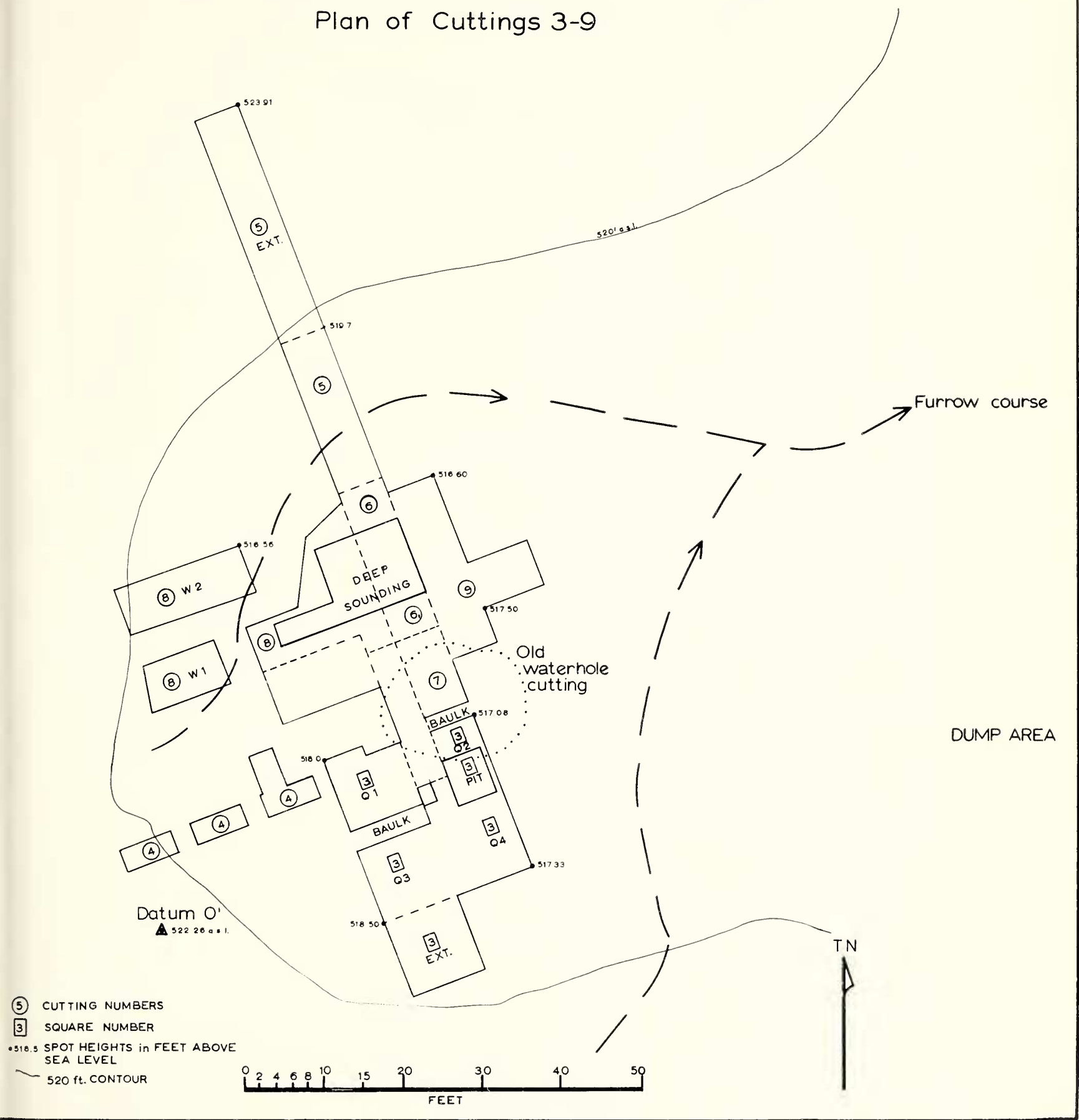


Fig. 5.

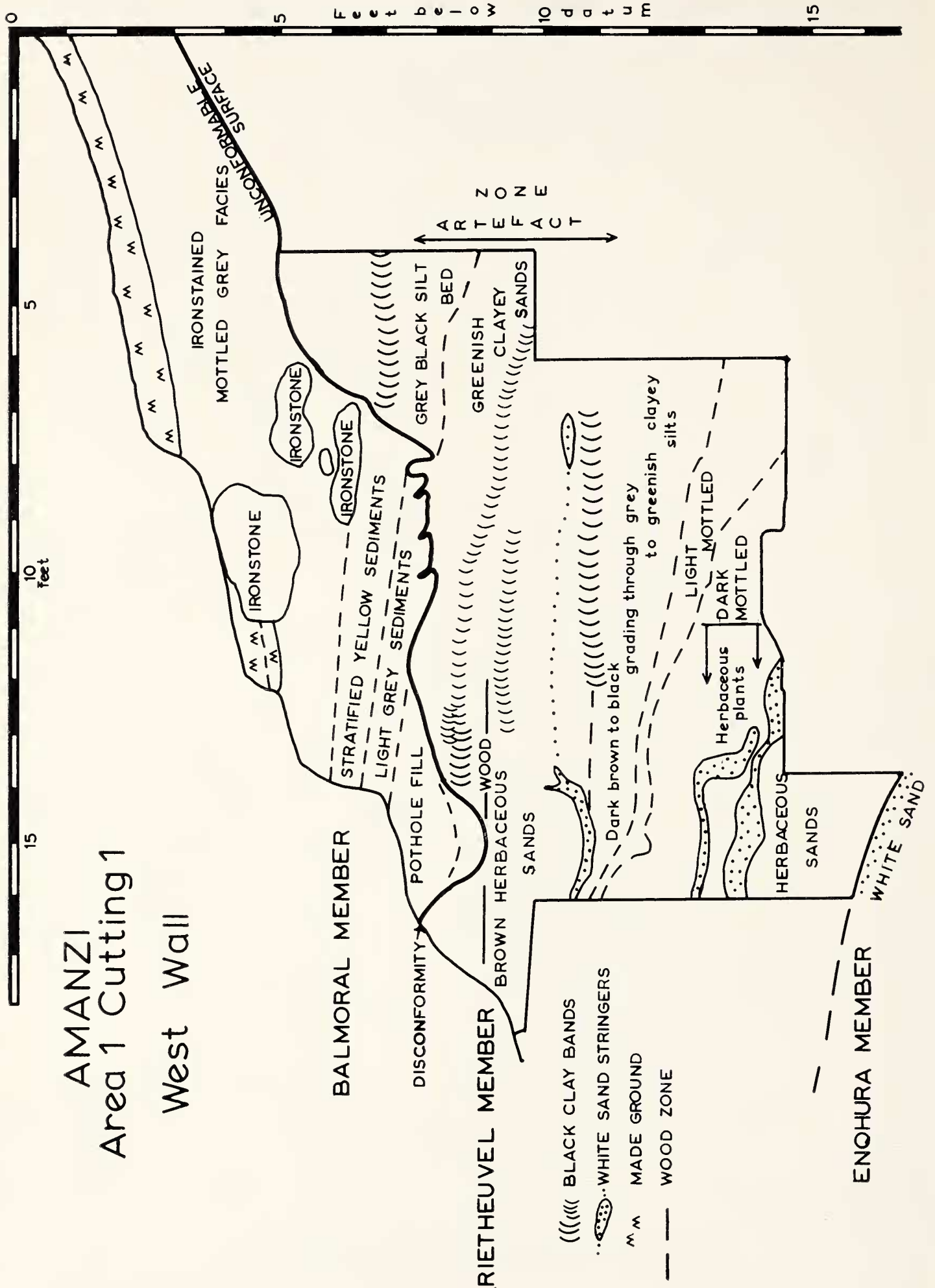


Fig. 7.

AMANZI
Area 1 Cutting 1
Plan of 1963 Excavation by Inskeep

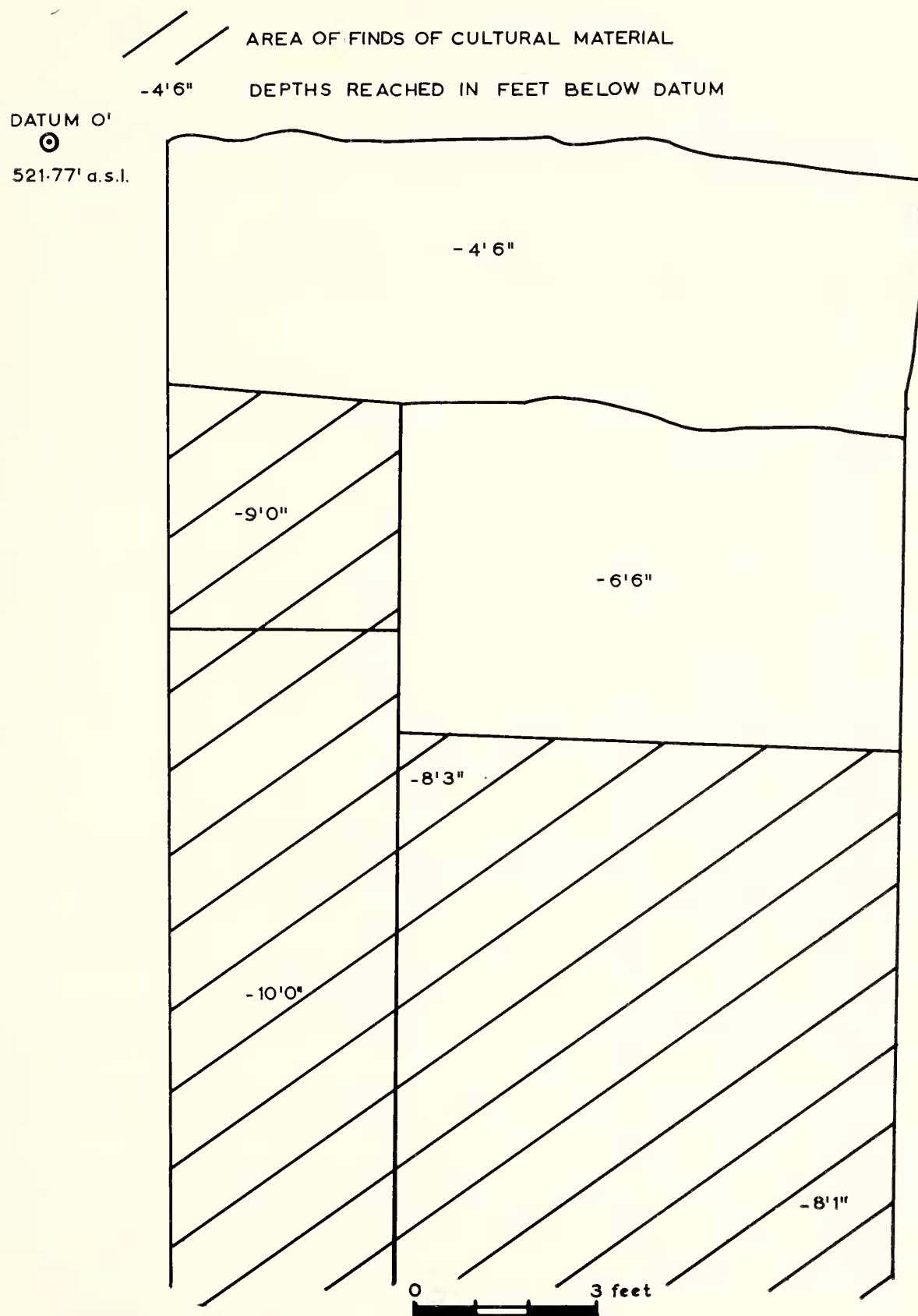


Fig. 8.

AMANZI

Plan of 1964-5 Excavation

Area1 Cutting 1

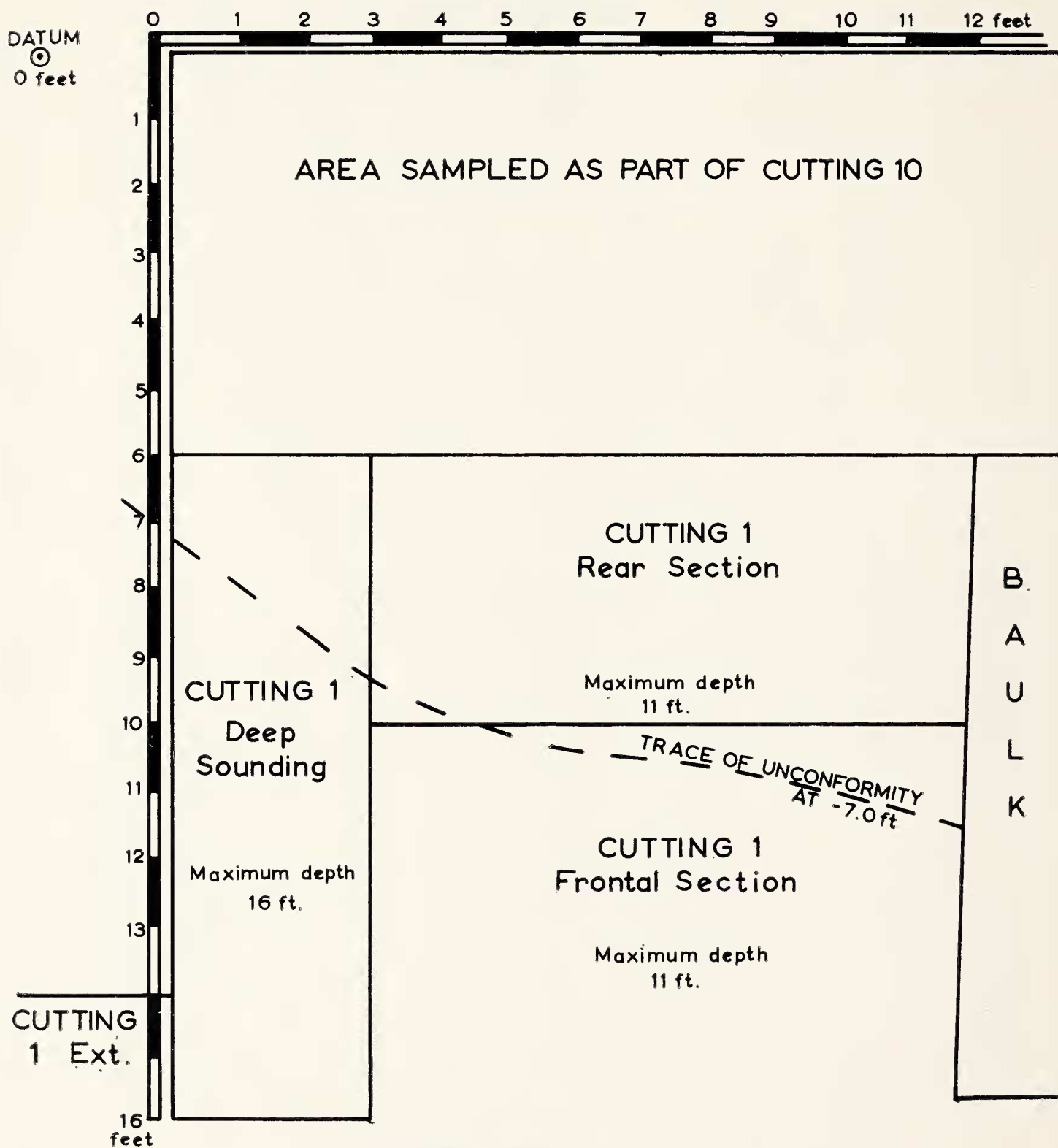


Fig. 9.

E

2

SQUAR

T ABOVE

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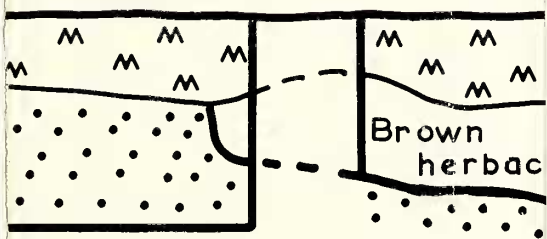
520

515

510

505

FEET



ENQHURA

AMANZI : AREA 1

Section across depression

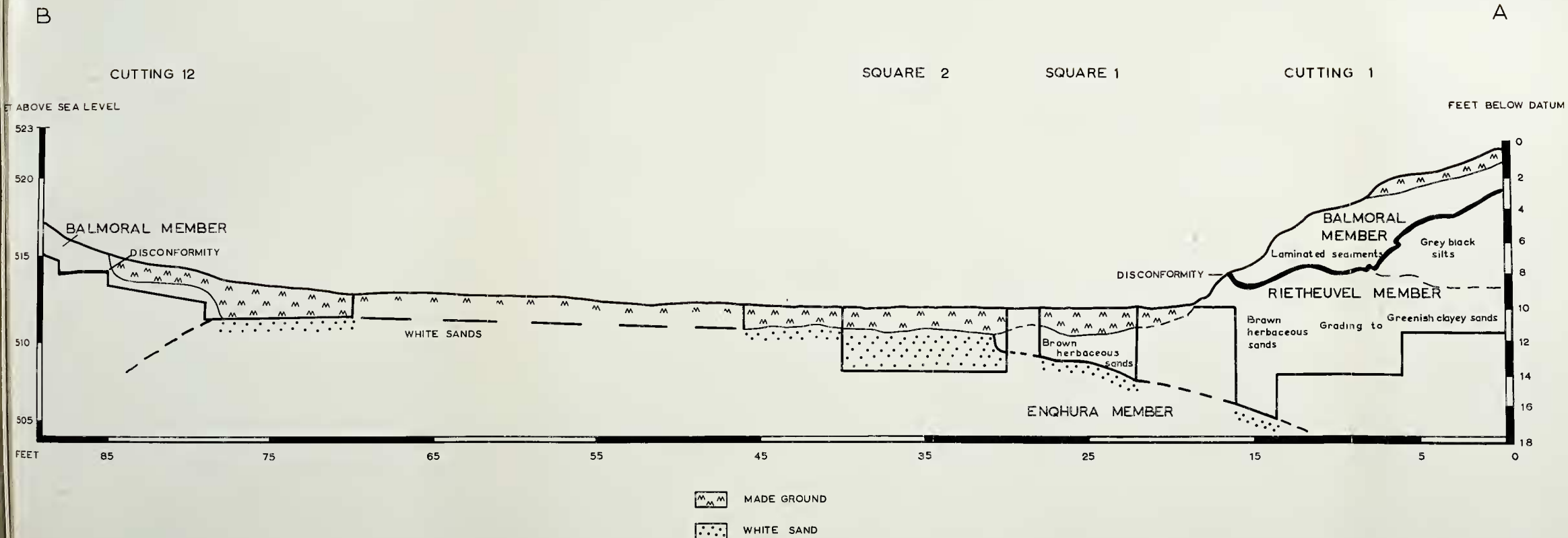


Fig. 6.

AMANZI
Spatial distribution of finds in Area 1
Cutting 1: Frontal section

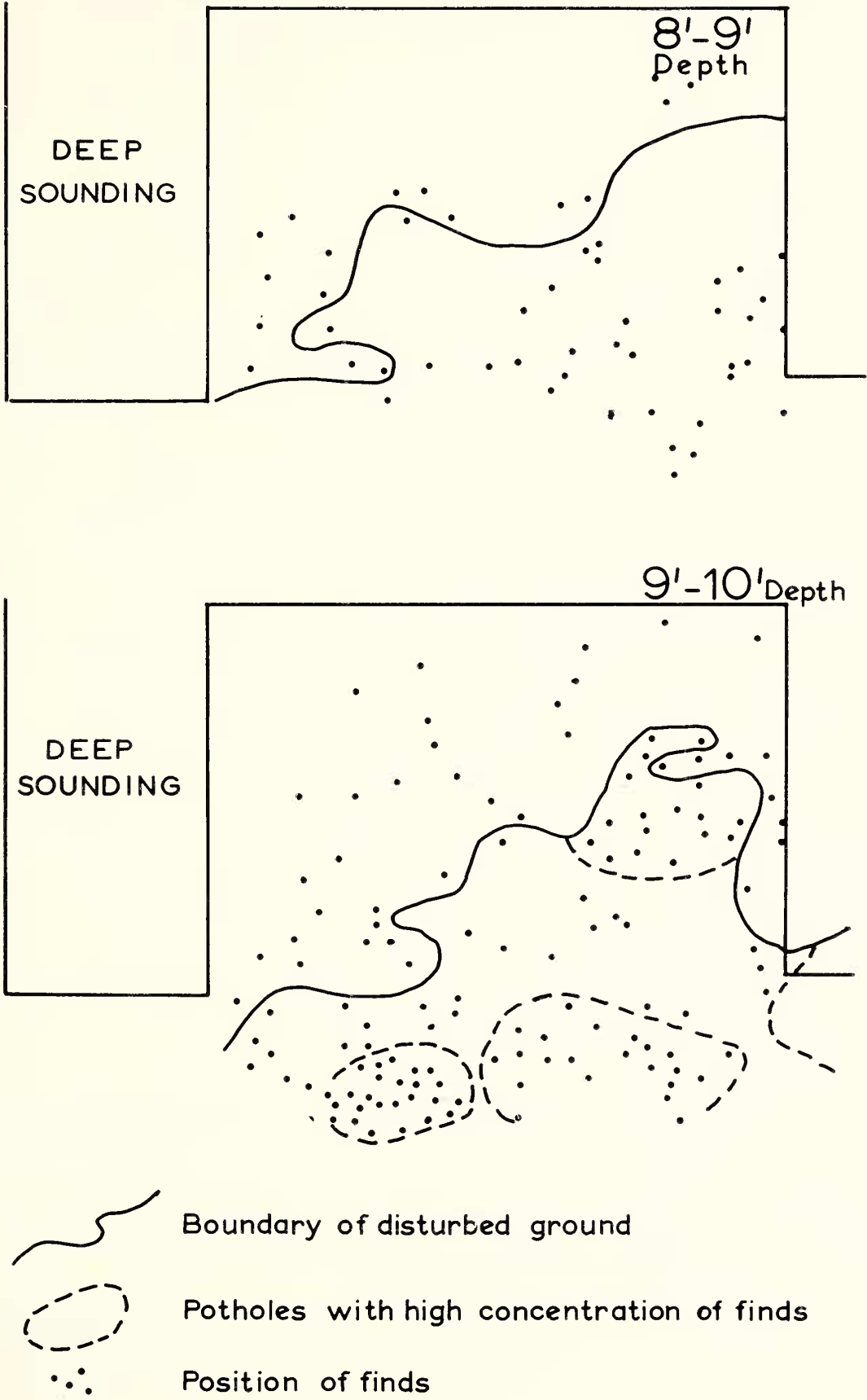


Fig. 10.

AMANZI
Cutting 1 and Extension

Distribution of finds of Wood

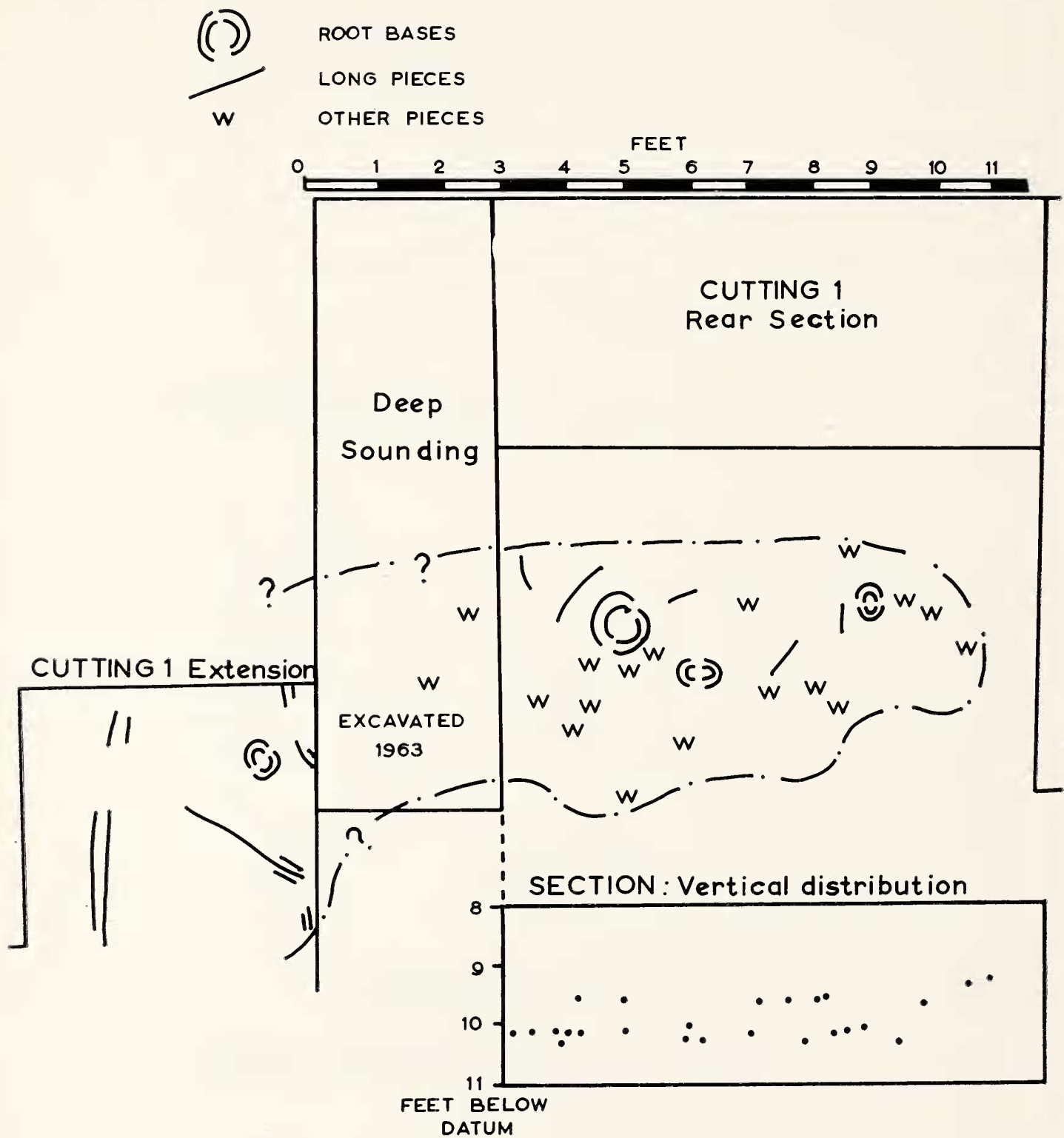


Fig. 11.

AMANZI
Area 1 Cutting 1 Extension

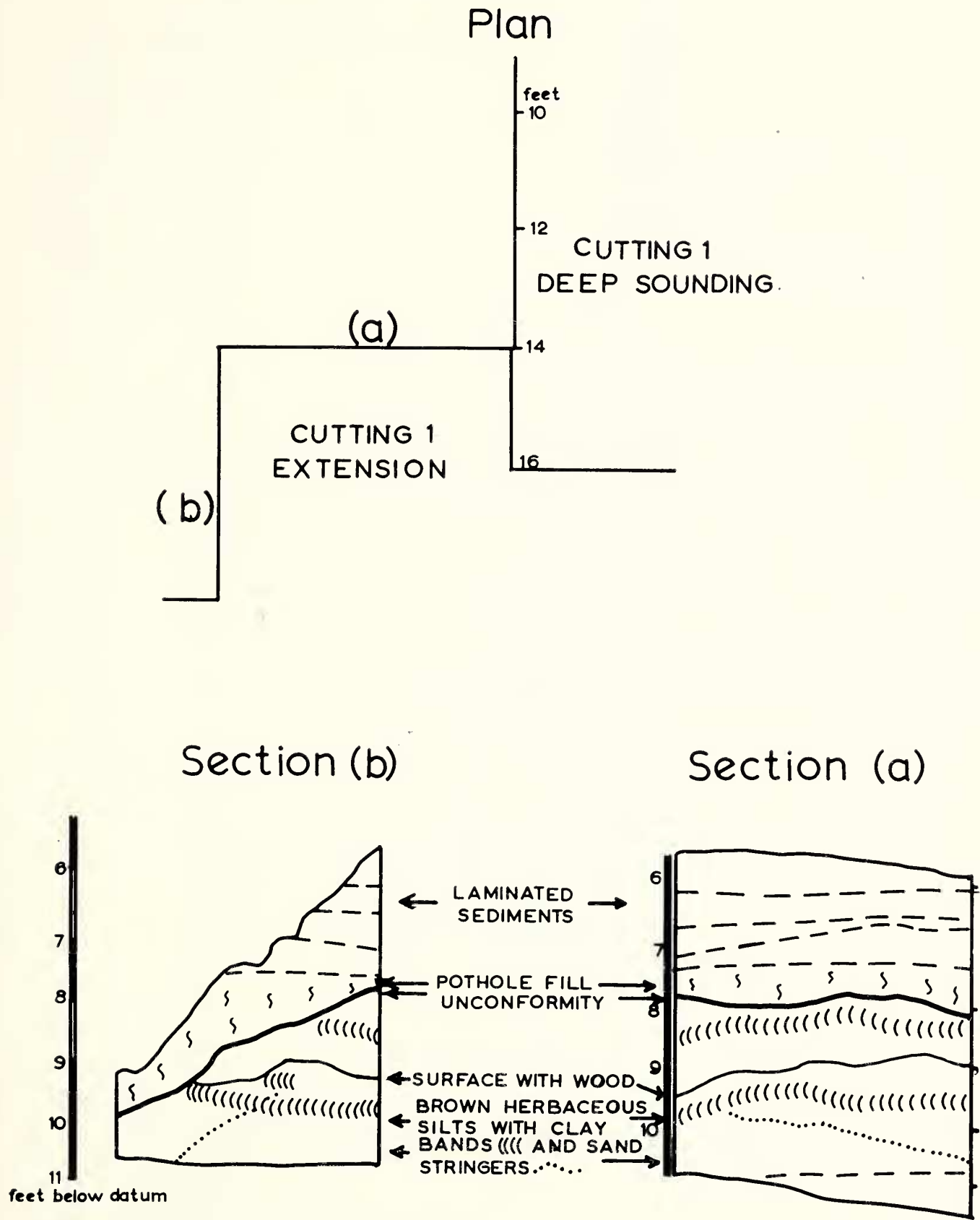


Fig. 12.

AMANZI: AREA 2
Section across Deep Sounding

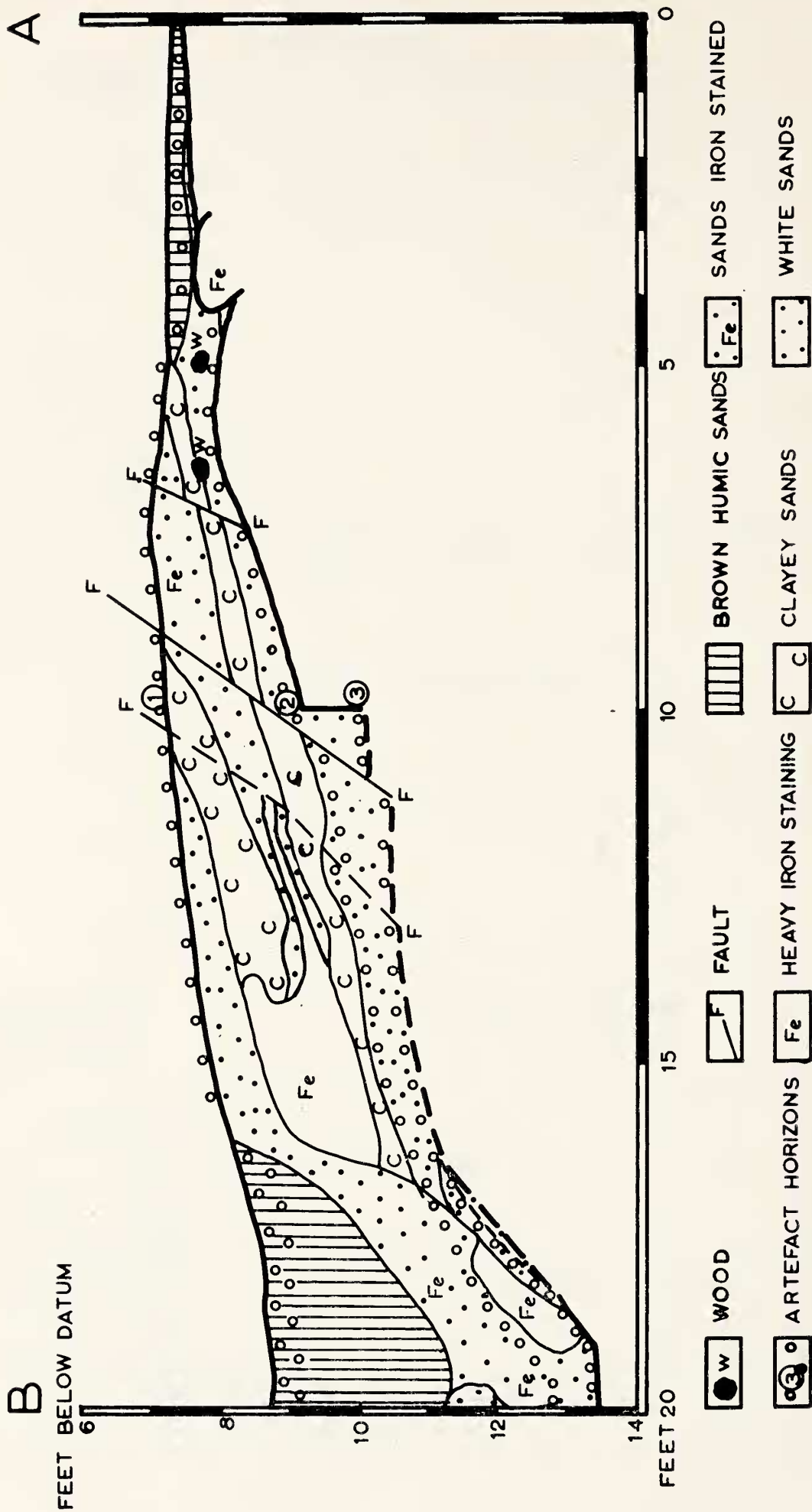


Fig. 14.

AMANZI

Area 1 Cutting 10

Location of artefact samples 1-3

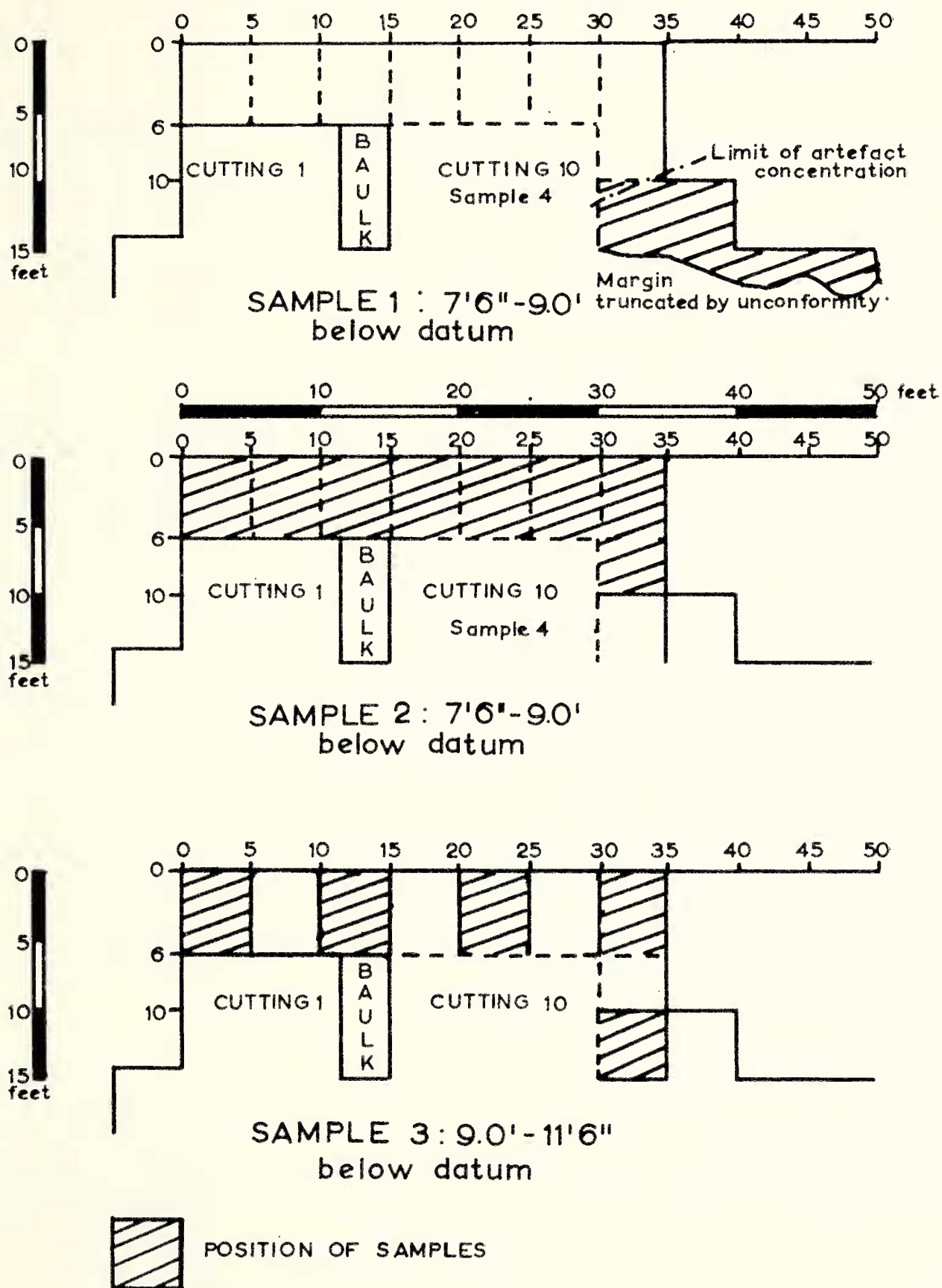


Fig. 15.

AMANZI

Distribution of all lithic material in depth: Cutting 10

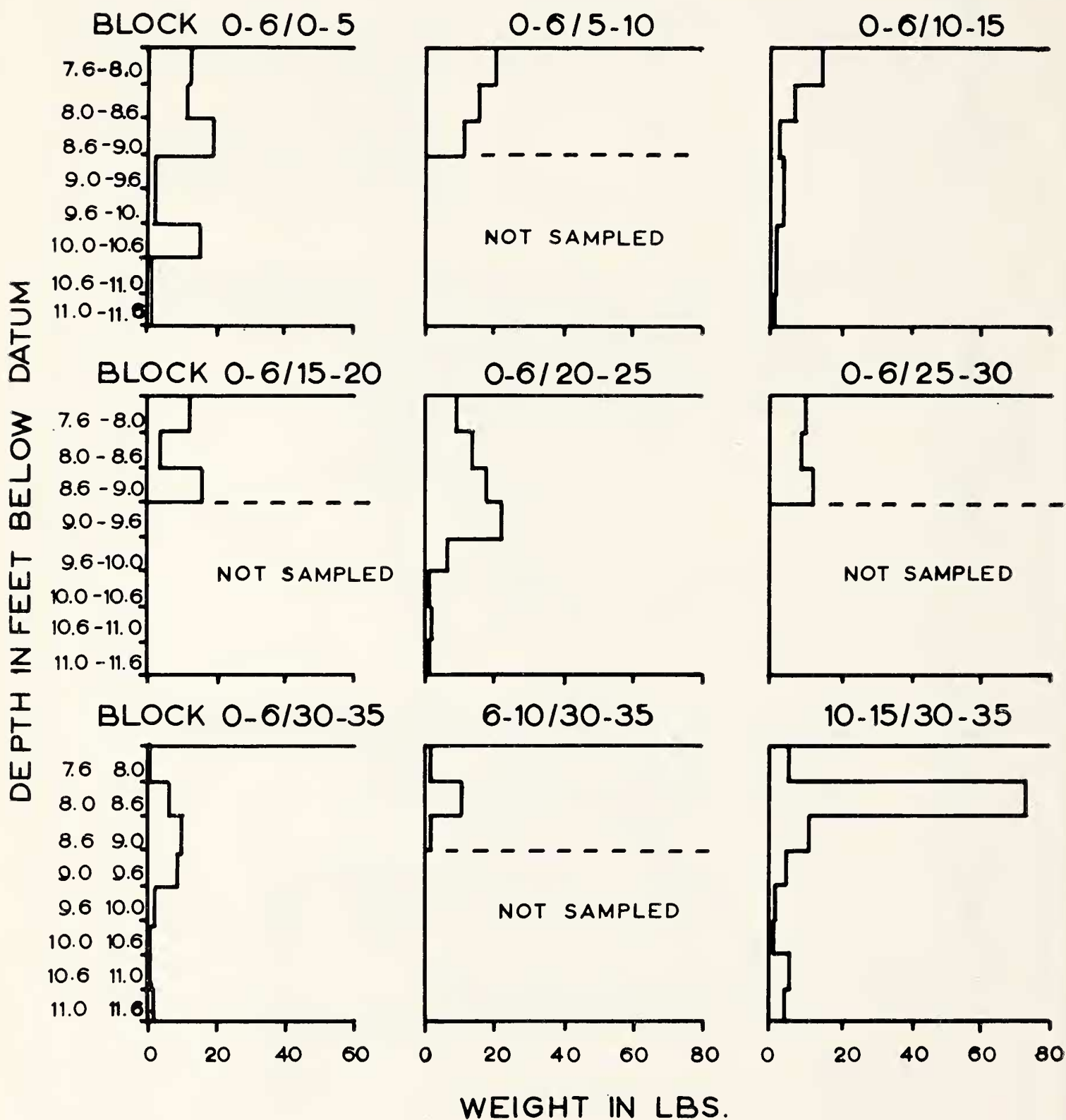


Fig. 16.

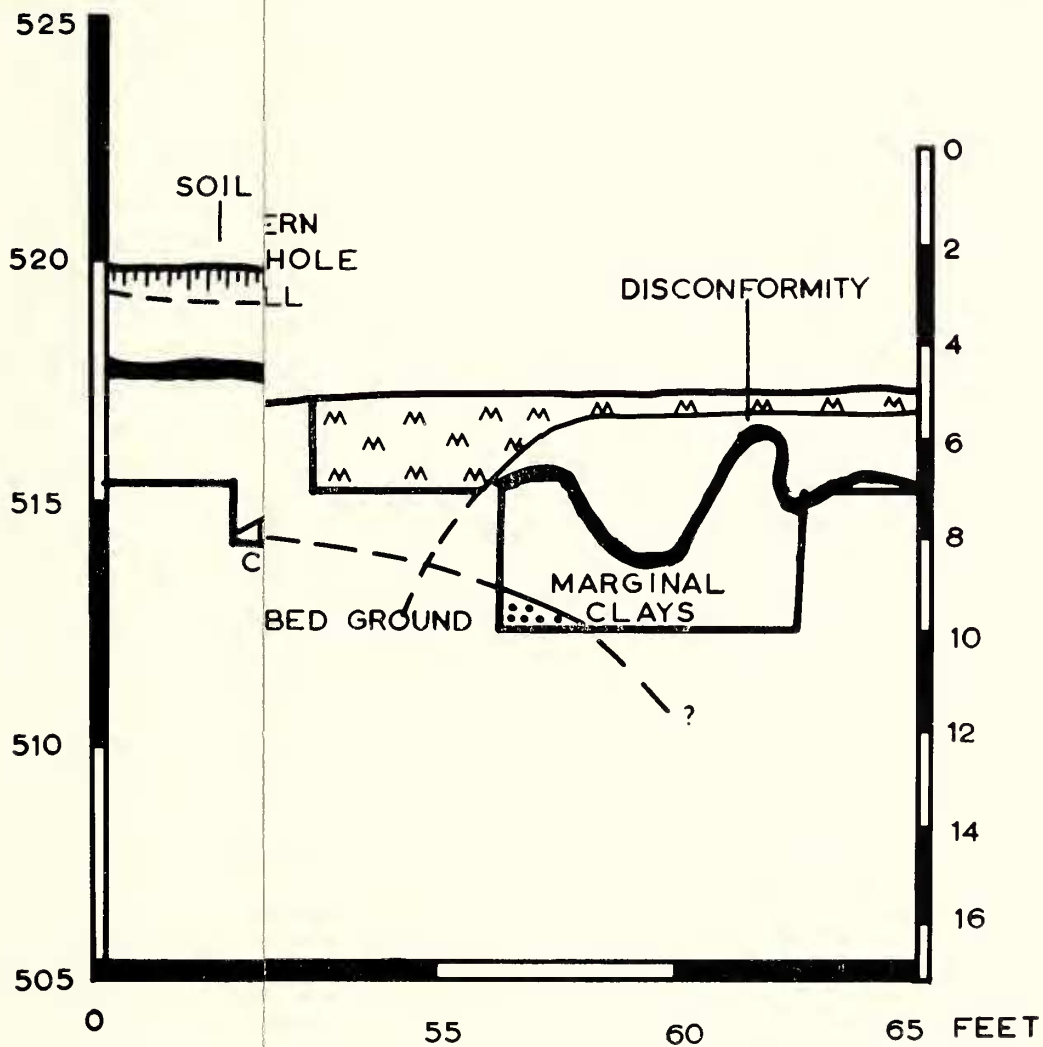
A

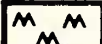
B

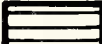
SQUARE 3
and
PIT

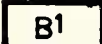
FEET ABOVE SEA LEVEL

FEET BELOW DATUM



 MARG

 STR ③

 BLA

AMANZI : AREA 2 Section across depression

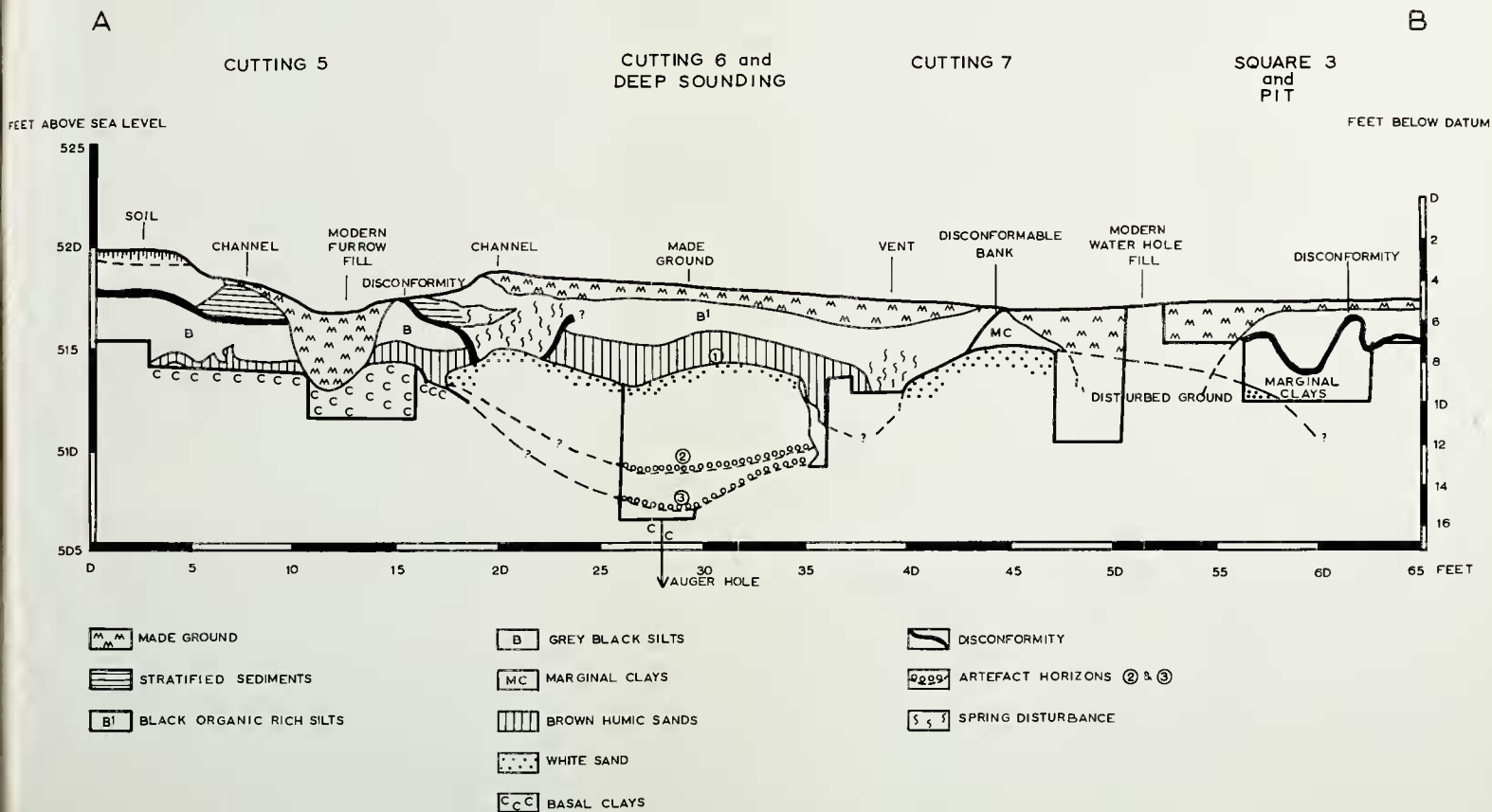


Fig 13.

AMANZI

Bar Charts of Finds in Area 1 Cutting 10

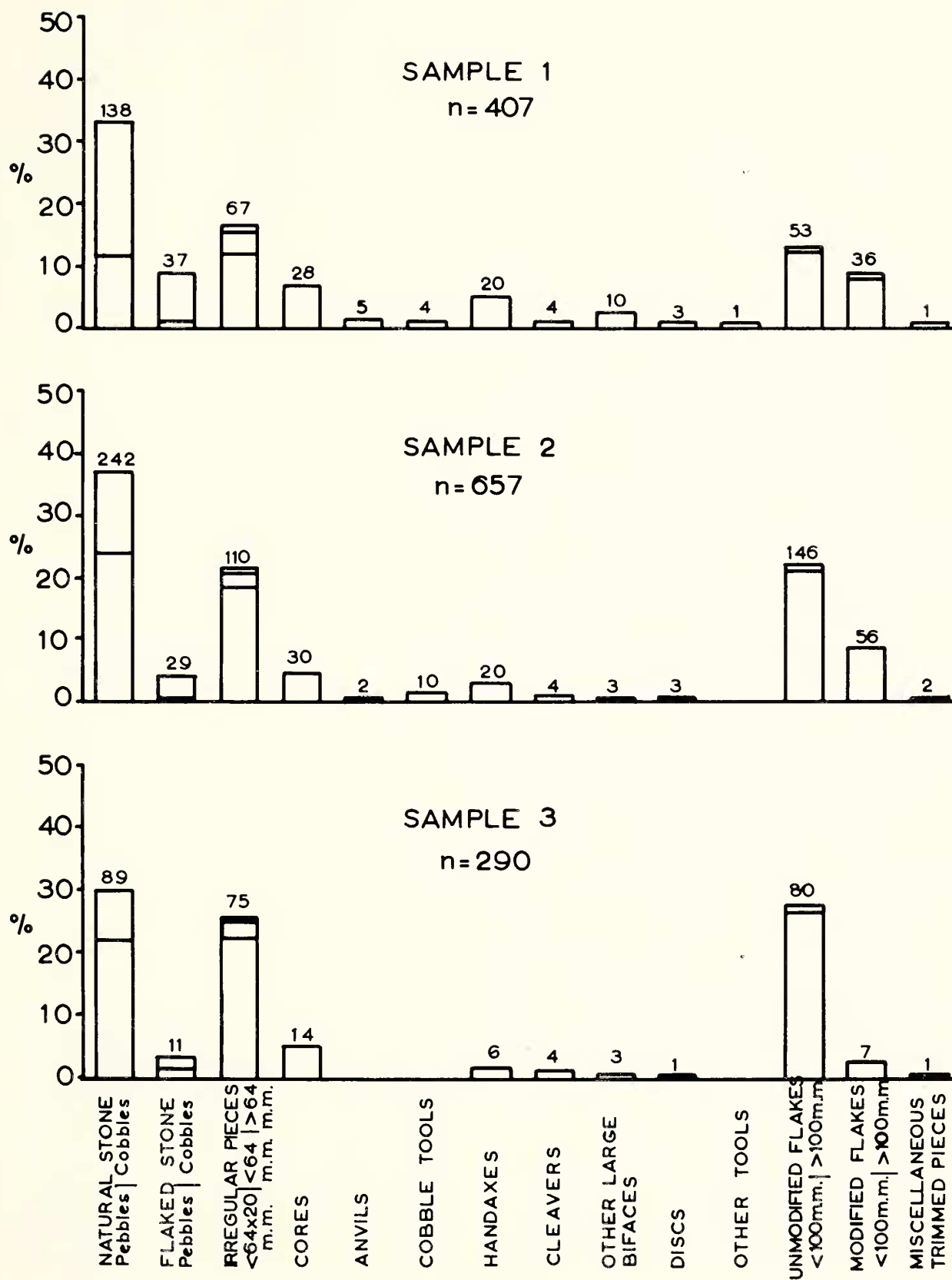


Fig. 17.

AMANZI

Bar Charts of Finds in Area 2

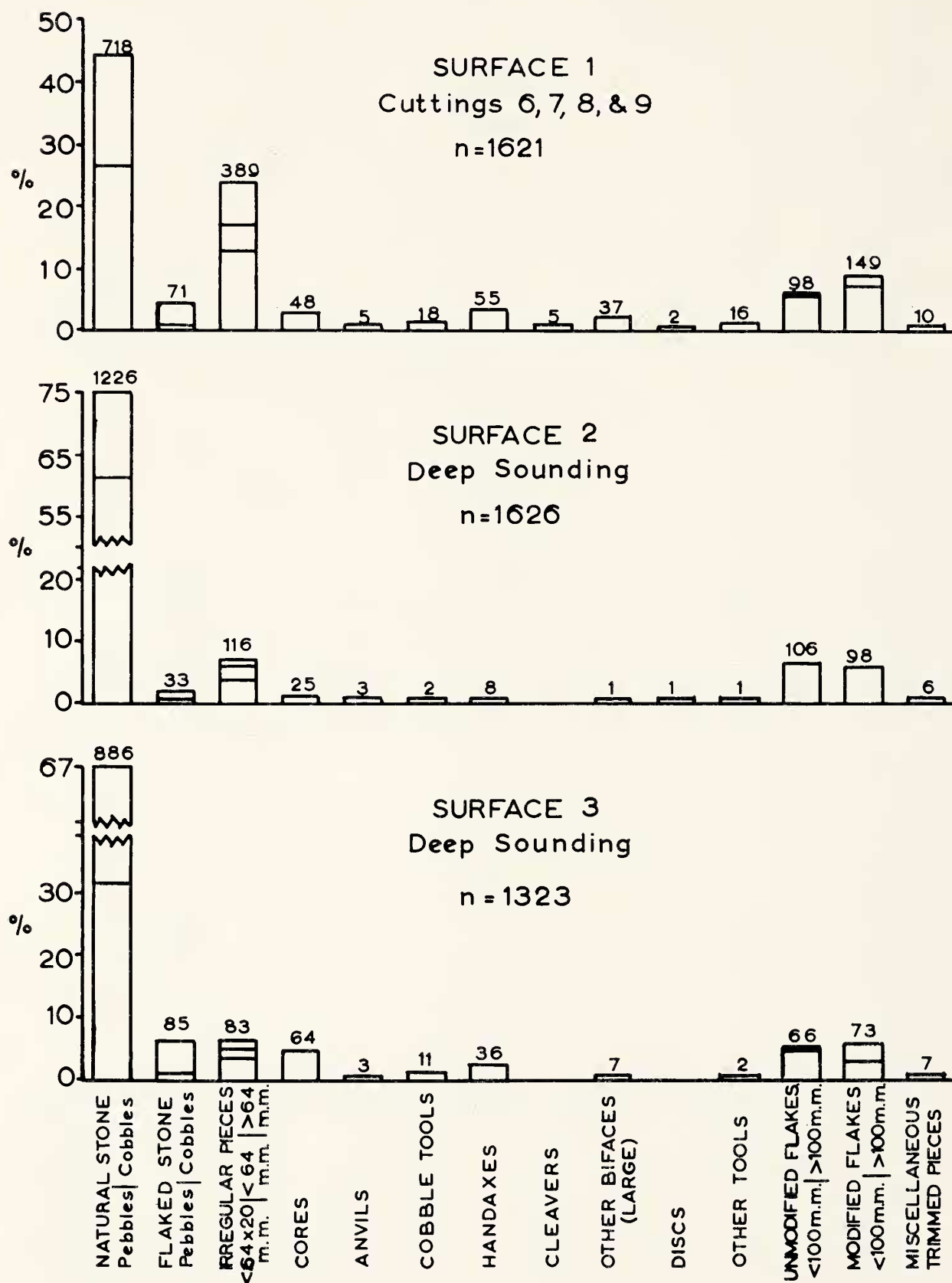


Fig. 18.

AMANZI

Bar Charts of Finds in Area 2: Cuttings 5, 6, & 8

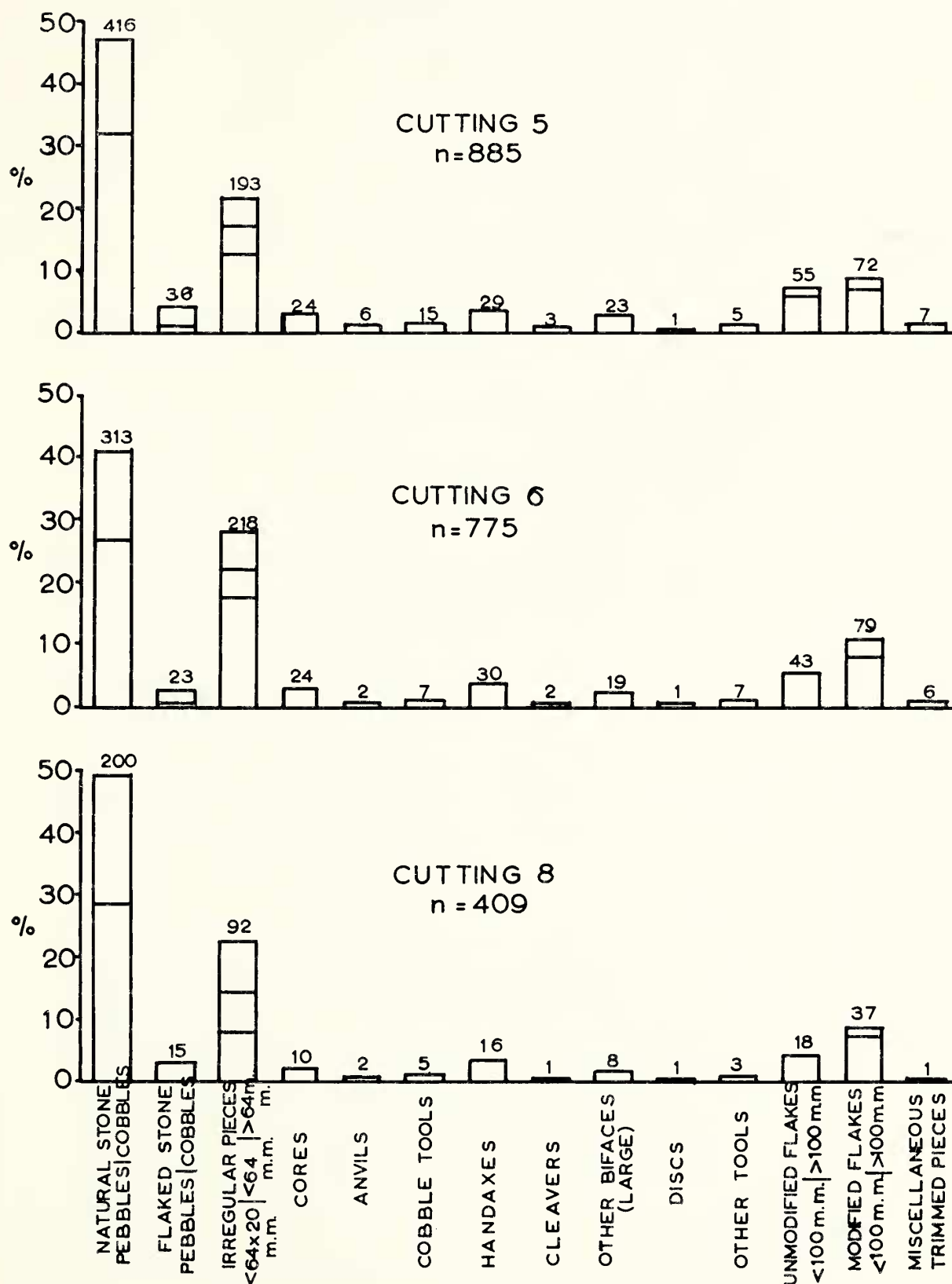


Fig. 19.

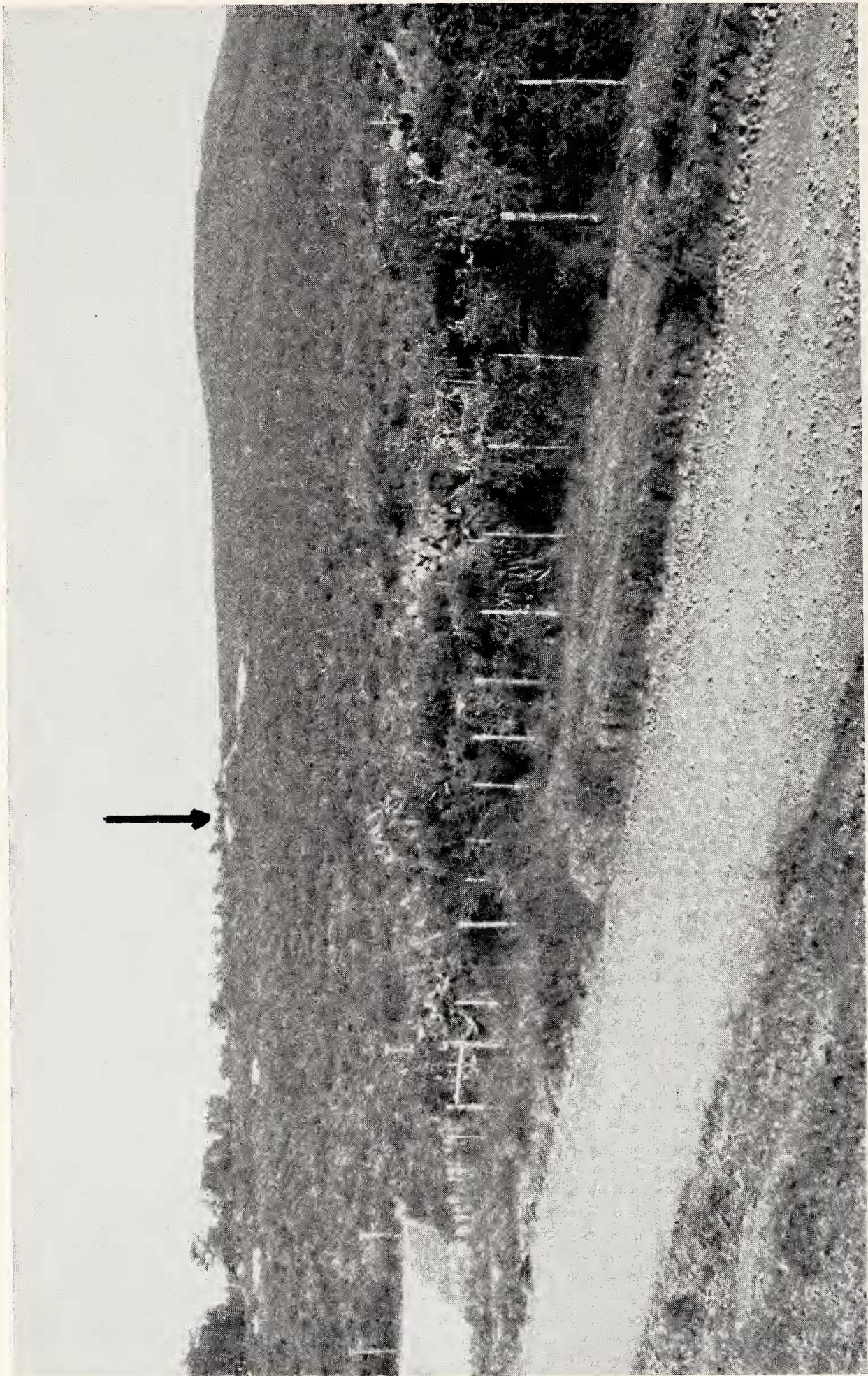


PLATE 1. AMANZI HILL.

The arrow indicates the position of the excavations on the northern flank of the hill. The vegetation is typical Addo Bushveld with the tall trees on the sky-line and the prickly pear in the foreground representing recent plantings or invasives.

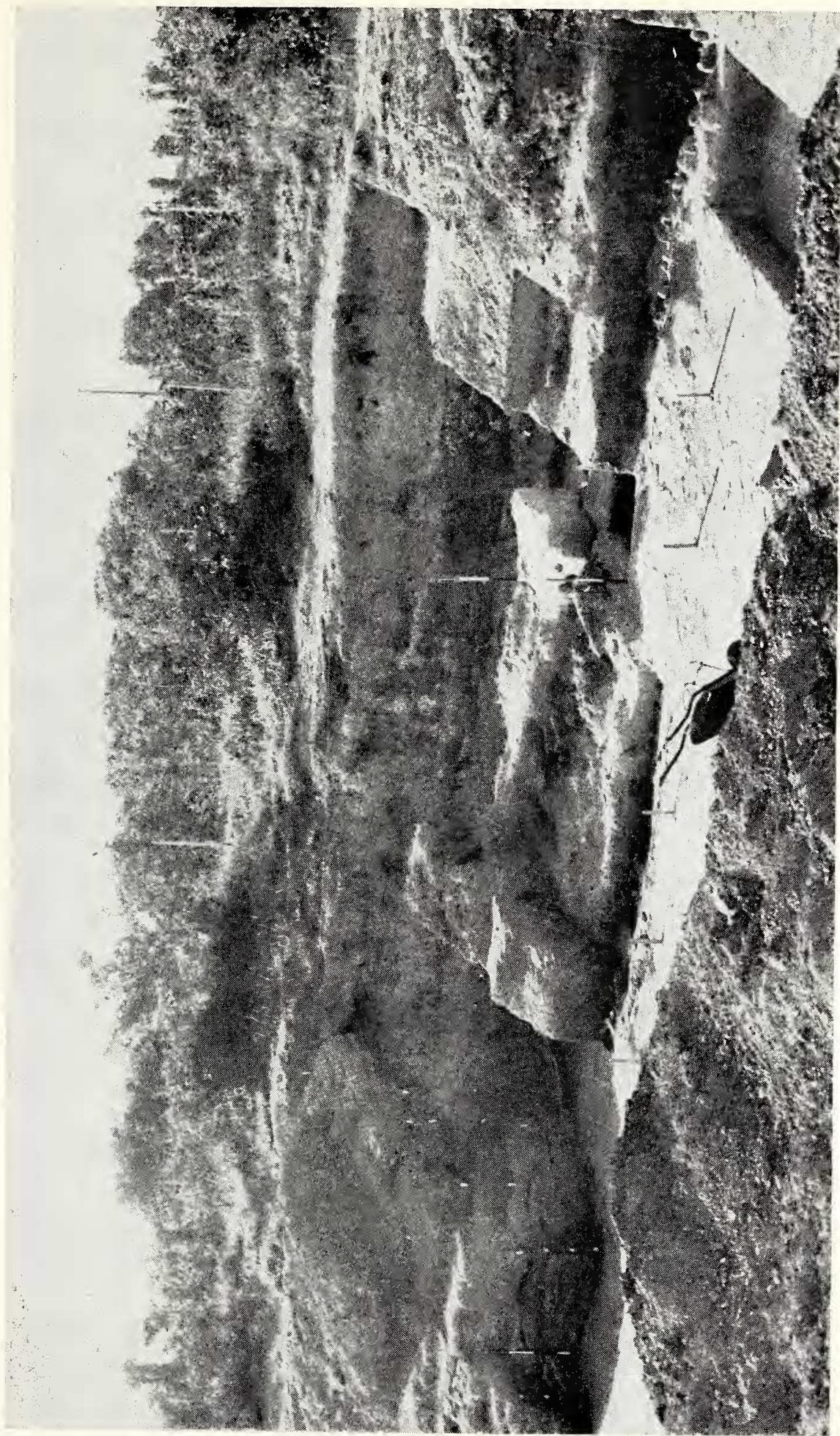


PLATE 2. AMANZI: Area 1.

Cuttings 1 and 10 at stage near the completion of the excavation, dug into the side of the depression and deepened to the general level of the floor.

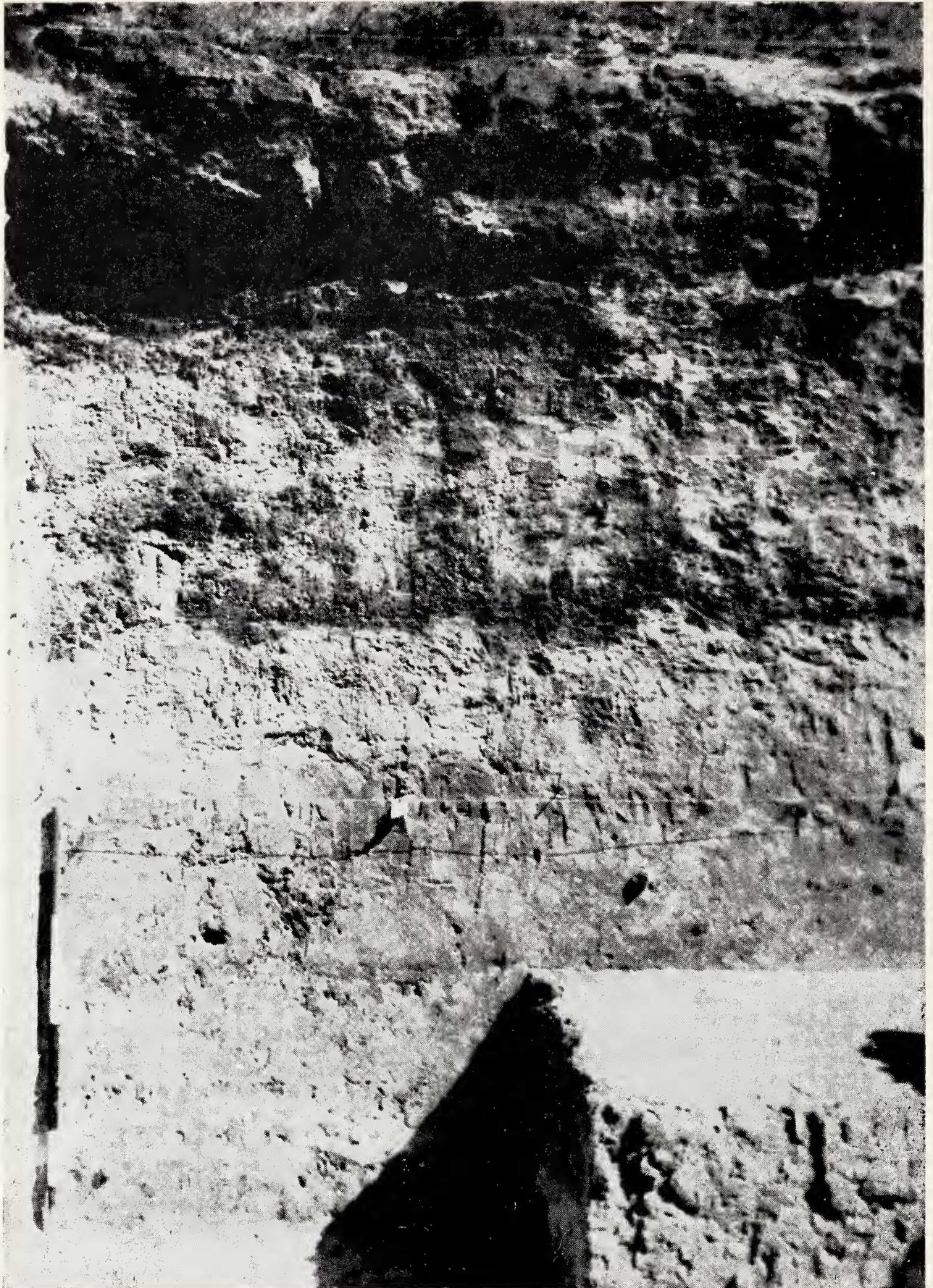


PLATE 3. AMANZI: Area 1, Cutting 10.

The north wall of Cutting 10 showing the exposed sequence of 11·5 feet of deposit. Iron-stone caps the sequence which shows some ferruginization to six feet above the base. The string line above the ranging pole indicates the top of the artefact accumulation which extends to the base of the cutting. The artefact accumulation was sampled to a depth of 9 feet below datum in a series of blocks, with alternate blocks deepened to 11·5 feet. The two blocks seen here are 0-6/0-5 (-11·5 feet) and 0-6/5-10 (-9 feet).

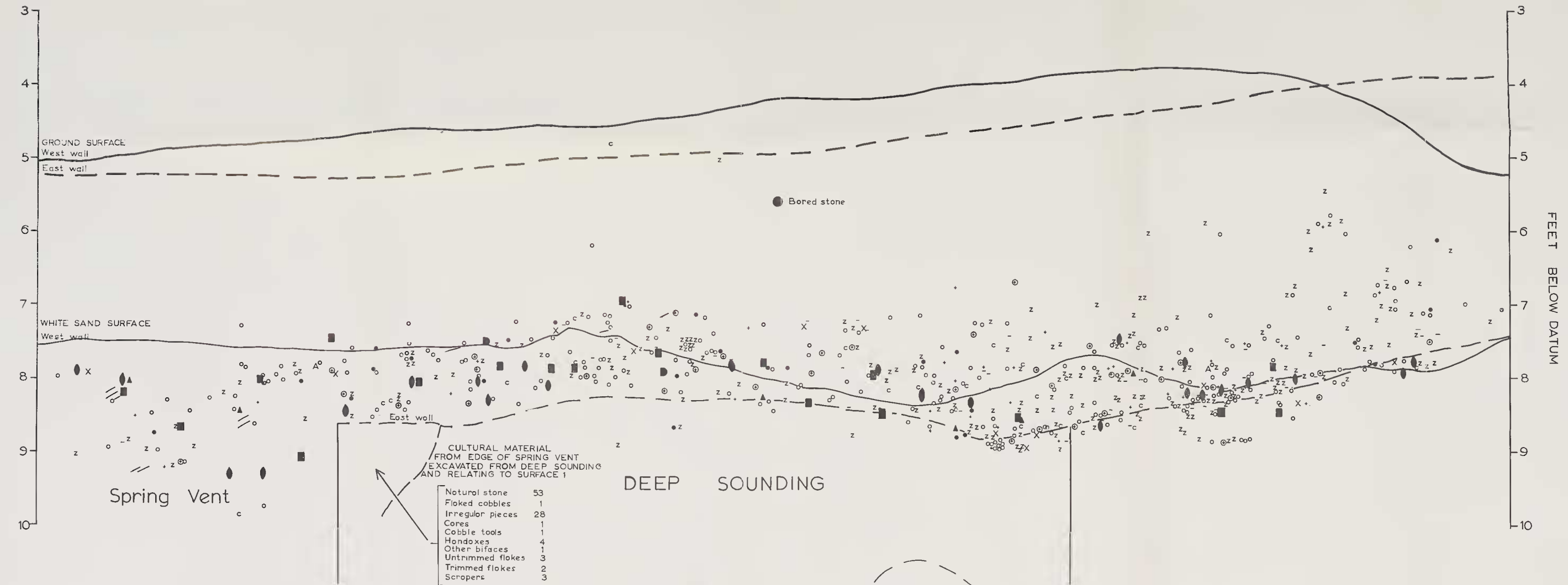
Ferruginization obscures the top of the grey-black silts and the contact with the underlying greenish yellow clayey sands is gradational between -8·5 feet and -9 feet. A sand stringer runs through the greenish sands a foot above the bottom of the section.

AMANZI

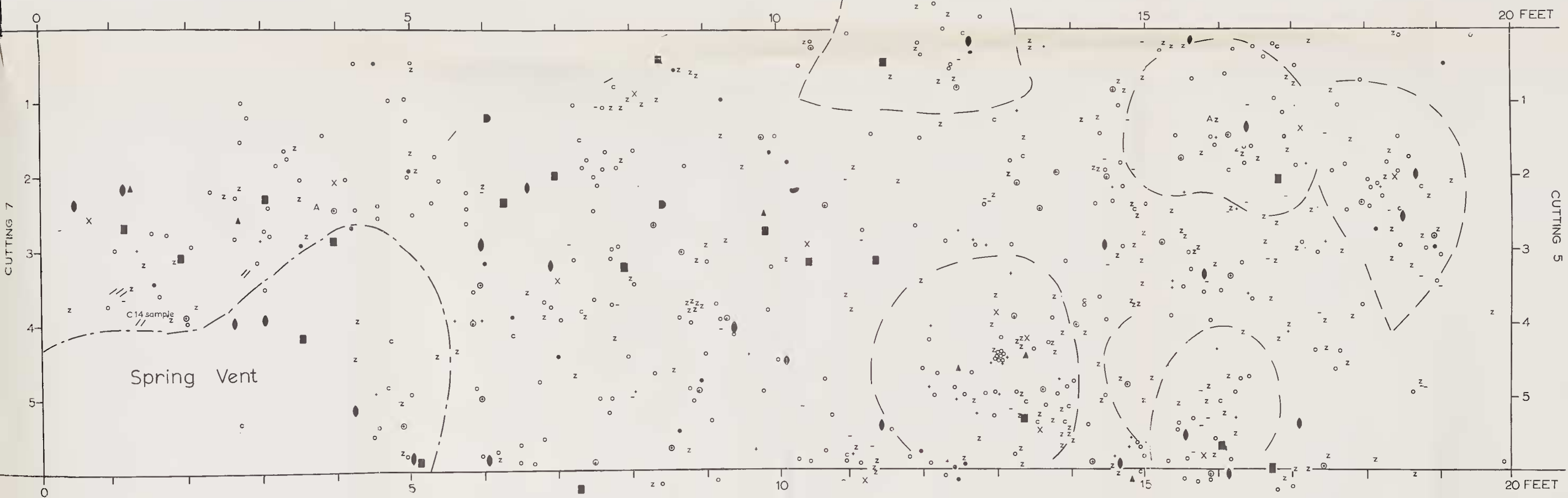
AREA 2 : CUTTING 6

Plot of finds

Section



Plan



- | | | | | |
|------------------------------|---------------------------------------|----------------|-----------------|----------------------------------|
| ----- Margin of spring vent | o Natural stone - Cobbles and pebbles | c Cores | ● Handaxes | x Other tools and Trimmed pieces |
| - - - - - Margins of hollows | • Flaked cobbles and pebbles | A Anvils | ■ Cleavers | - Untrimmed flakes |
| /// Finds of wood | z Irregular pieces | ▲ Cobble tools | ■ Other bifaces | + ◊ Trimmed flakes / Scrapers |

Fig. 20



PLATE 4. AMANZI: Area 1, Cutting 10.

In the frontal portion (6-15/15-30, co-ordinates: peg 15/20 in right foreground) of this cutting only the overburden of unconformable sediments was stripped off to expose the unconformity. The grey-black silts are seen cut as a smooth bank at the foot of which are a series of potholes exposing the underlying greenish yellow clayey sands. The cultural material from the base of the eroded surface has been collected; however, some material *in situ* in the deposit can be seen in the base of the grey-black silts and in the underlying deposits.



PLATE 5. AMANZI: Area 1.

Wood on a definite surface in Cutting 1, Extension, this is part of the occurrence of wood near the top of the brown herbaceous sands (Rietheuveld Member) in Cutting 1 that was reported by Inskeep (1965). As excavated, the wood was plotted, wrapped in foil and plastic to prevent rapid drying out and stored; the plate shows a stage in this process. A plot of the wood on this surface is given in text Fig. 12. The pothole fill (Balmoral Member) can be seen above the marker tag at the top left of the plate and the unconformity at the base of this deposit traced to the right to where it truncates a thin black clay band. The latter is a useful stratigraphic marker.



PLATE 6. AMANZI: Area 1.

A piece of wood from Cutting 1, Extension in the brown sands. The twisted grain of the wood suggests this is a root stock.



PLATE 7. AMANZI: Area 1, Cutting 10.

10-15/35-40. Within the artefact accumulation some groups such as this occur. Several pieces are on "edge".



PLATE 8. AMANZI: Area 2.

A general view of the excavation in progress. In the foreground in Cutting 6 and 8 the white sands are exposed (Surface 1) and some cultural material is seen on this surface. Small depressions in this surface are evident. Beyond the low baulk (in the channel fill) is Cutting 5 and an extension as a series of steps up the side of the depression.

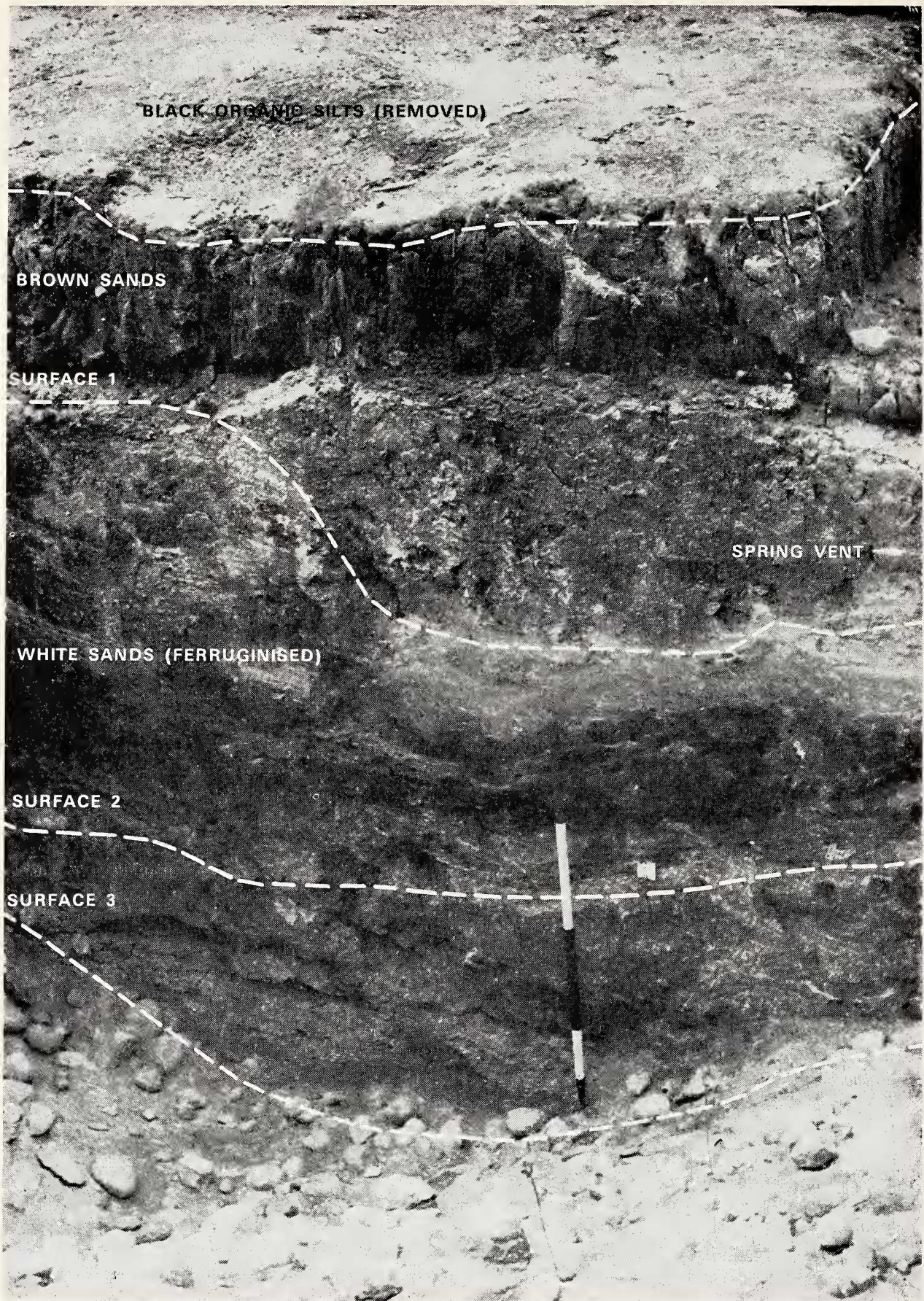


PLATE 9. AMANZI: Area 2: Deep Sounding.

The deep sounding in Area 2 was excavated below Surface 1 in Cuttings 6 and 8 seen in the foreground of the previous plate. Two surfaces were intersected and the artefact occurrence on Surface 3 can be seen. The slope of these stone lines show the context of the cultural material to be wholly disturbed. The brown humic sands thicken in one corner of the sounding on the edge of a spring vent. Acheulian artefacts were excavated from the base of the brown humic sands and on Surfaces 1-3.



PLATE 10. AMANZI: Area 2: Deep Sounding.

Surface 3 has the appearance of a cobble pavement with natural stone and artefacts packed on a defined surface.



PLATE 11. AMANZI: Area 2.

A section cut in the side of the cleaned out furrow, 60 feet towards the outlet from Cutting 5. The grey-black silt (Rietheuveld Member) shown as a white band in this photograph is truncated at either end by later unconformable deposits (Balmoral Member). Cultural material and natural stone can be seen in the top of the underlying deposits.



PLATE 12. AMANZI: Area 2.

Wood and artefacts on the edge of the spring vent in Cutting 6 in the top of the white sands. Wood from this occurrence was dated to 38,100 $\pm$ 2000 years B.P.

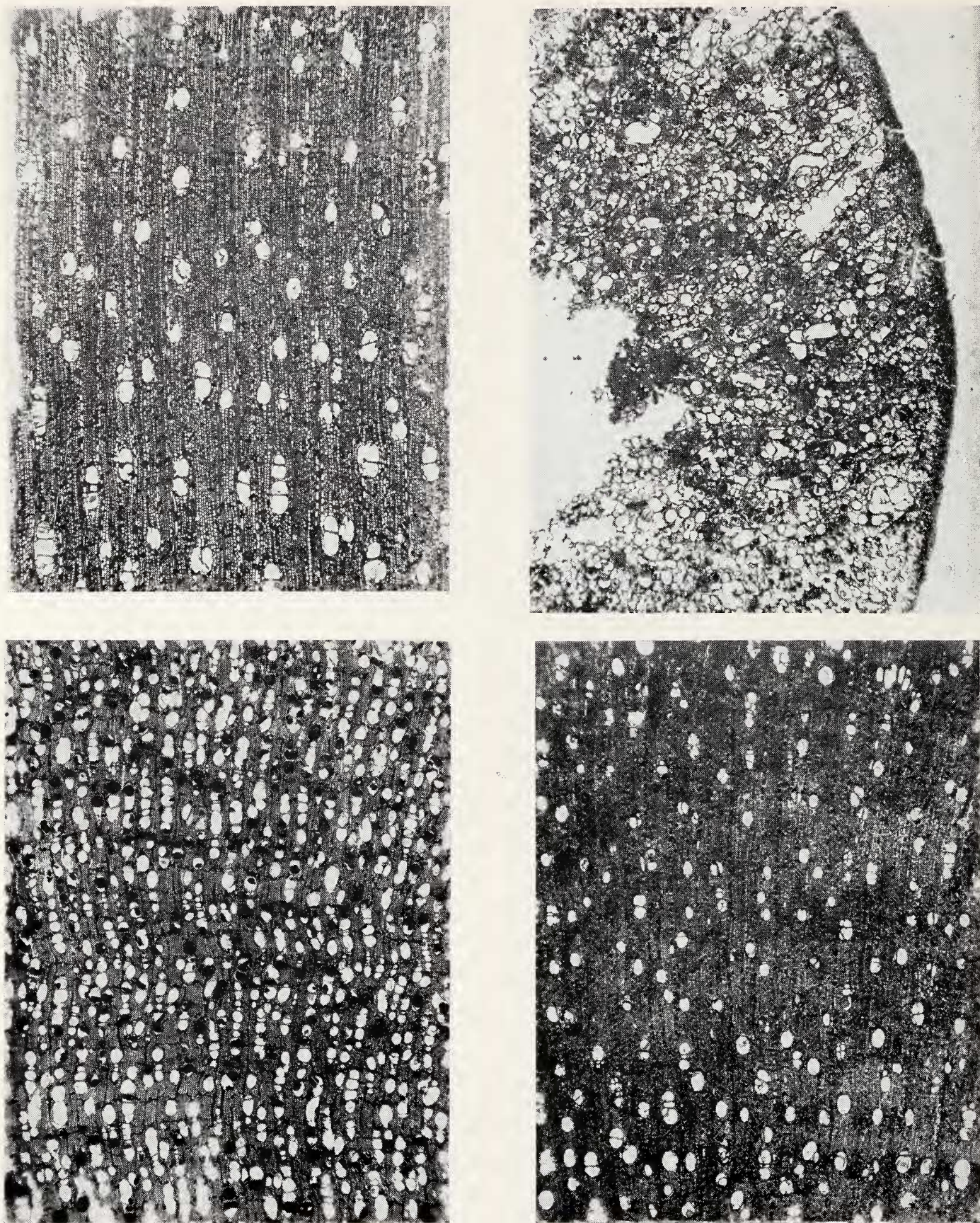


PLATE 13. AMANZI: Wood.

Photomicrographs of four transverse sections ($\times 20$) of wood from the site prepared by the Forestry Research Unit, Department of Forestry, Pretoria. The specimen on the top right is a section of a woody plant with a marked pith that is found with the herbaceous plants in Area 1 as part of the fringing vegetation of the fossil spring. The other examples can be generally classified as hardwoods (Dicotyledenous woods), but the absence of any key to the identification in section of indigenous trees and shrubs and some collapse of cell structures makes positive identification impossible at this stage.



PLATE 14. AMANZI: Area 1, Square 2.

In this vertical section in the white sand horizon the branched upper portion of stems of a herbaceous community are exposed. The community could be seen to be rooted in the sands and the plant remains represent aquatic communities growing on the surrounds of the spring and close to the vent or "eye" of the spring.



PLATE 15. AMANZI: Area 2.

Wood from the Deep Sounding between Surfaces 1 and 2; this is the only piece of wood found in the excavations which shows any features which might evidence working ($\times 1$ approx.).

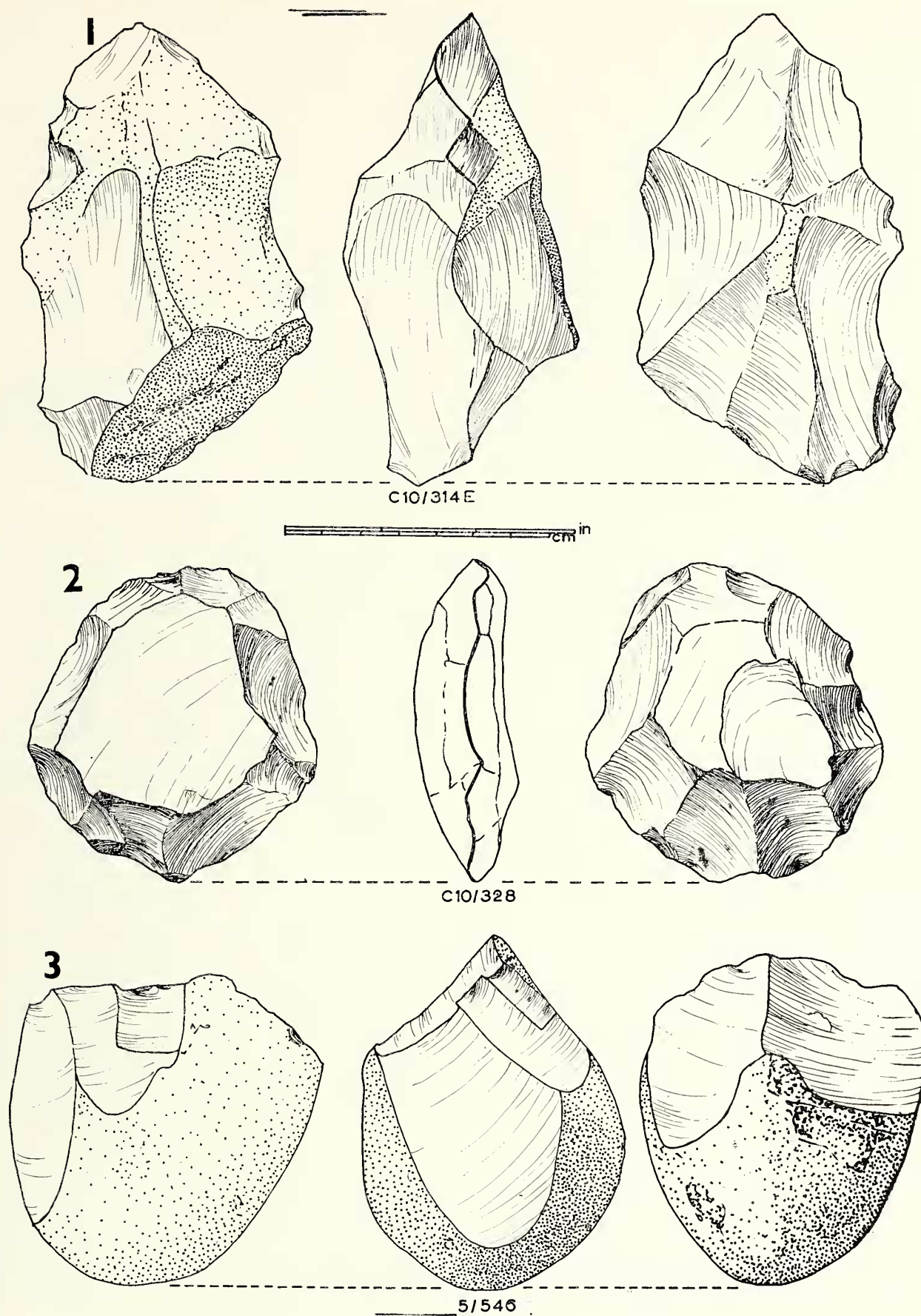


PLATE 16. AMANZI: Cores.

1. (C10/314E). Radial core with extensive cortex retained on the under surface, from Cutting 10, Area 1.
2. (C10/328). A disc-like core, an intermediate form between the radially flaked cores and a disc tool. From Cutting 10, Area 1.
3. (5/546). Irregular core on a cobble, from Cutting 5, Area 2.

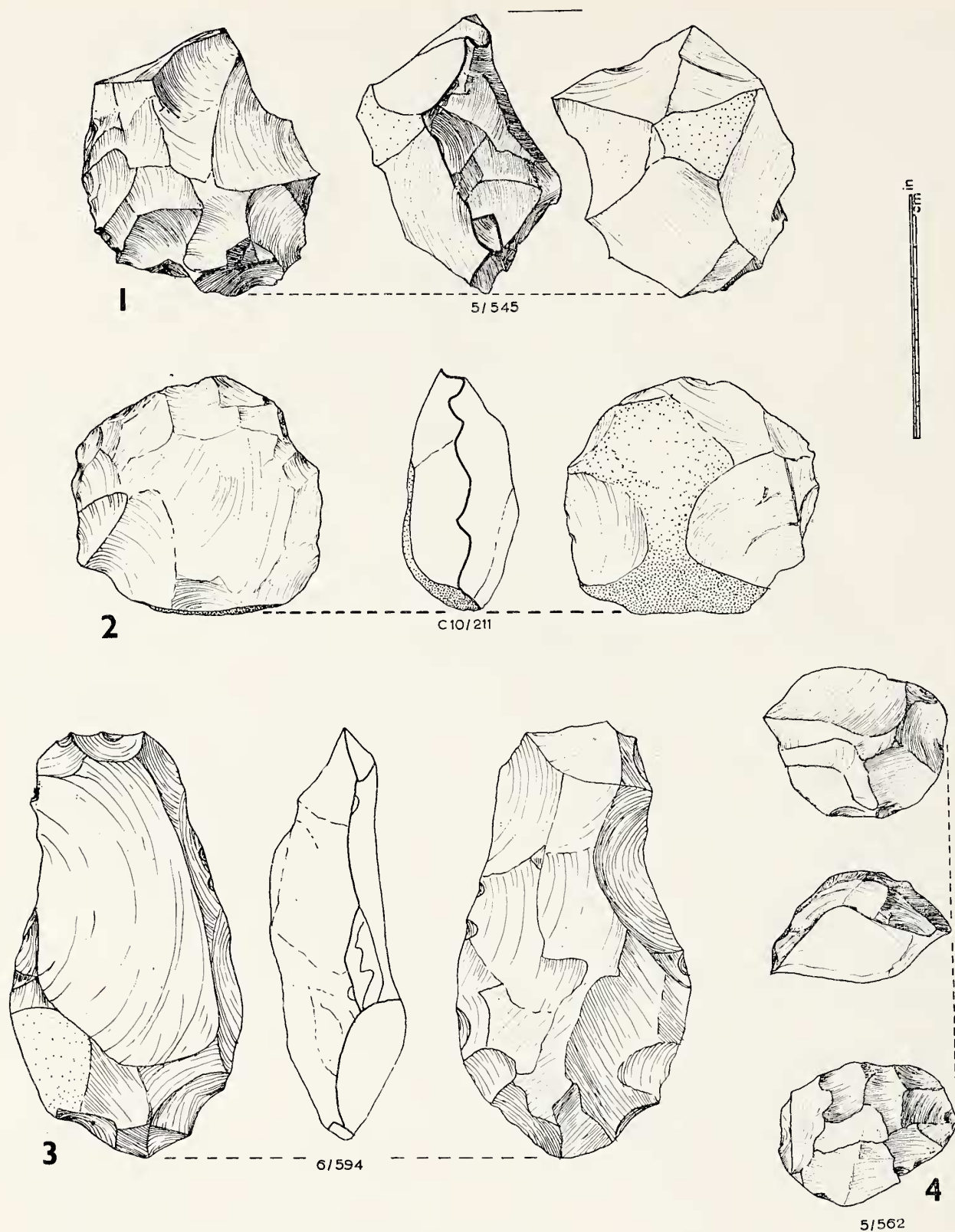


PLATE 17. AMANZI: Cores and Disc.

1. (5/545). Radial core with a biconical form. Cutting 5, Area 2.
2. (C10/211). Disc. A class considered separate from the radially flaked core subclass only on the degree of flaking on the perimeter which may indicate these artefacts were shaped tools. The frequency of discs in the samples is low. From Cutting 10, Area 1.
3. (6/594). Struck core; from Cutting 6, Area 2.
4. (5/562). Small radial core of the type which could be alternatively classified as a discoïd. The pattern of flaking on the upper and lower faces is essentially similar to that of Plate 17, No. 1 and these implements are thus grouped with the radial cores.

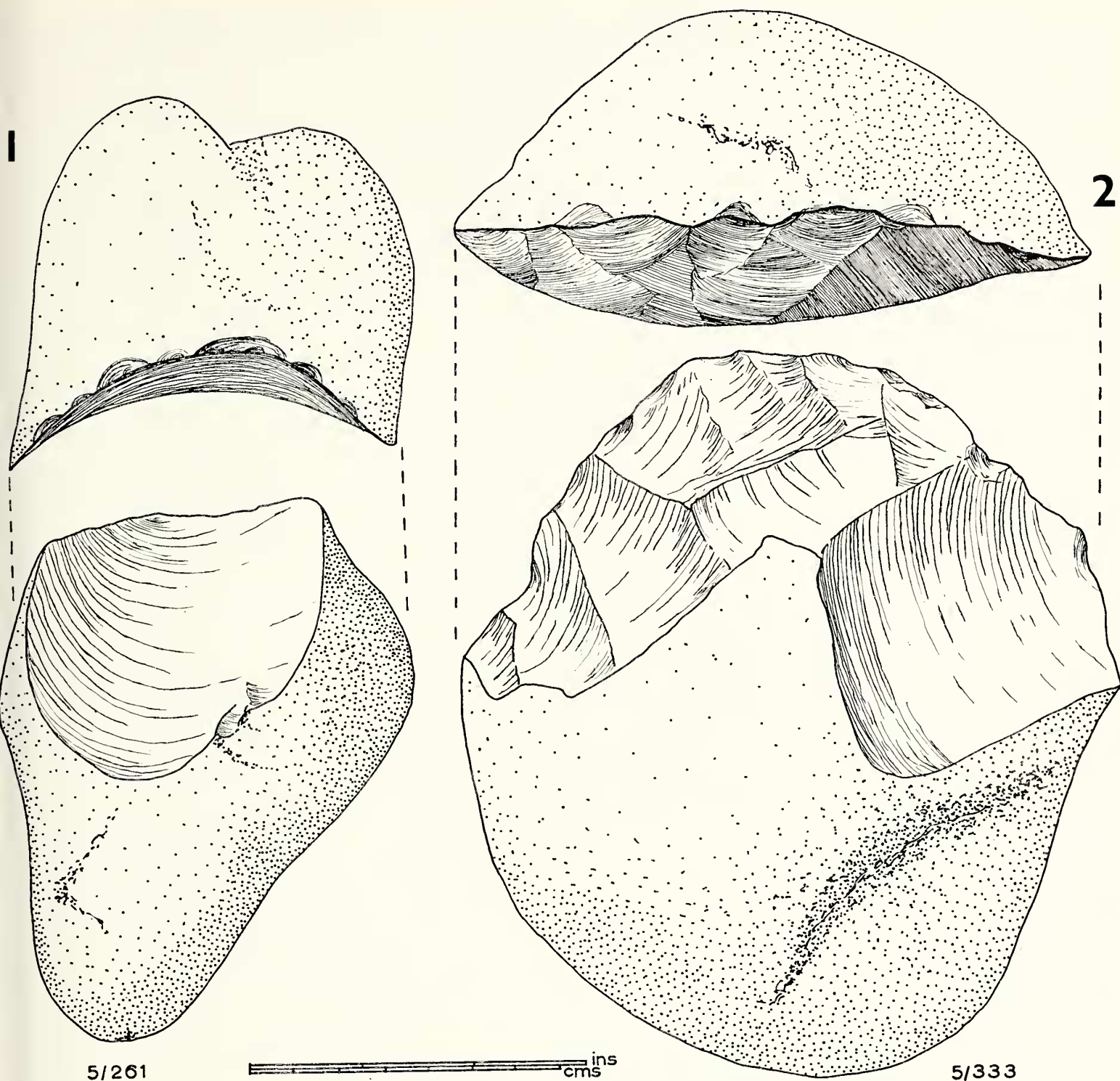


PLATE 18. AMANZI: Cobble Tools.

1. (5/261). An example of a scoop-like cobble tool. There are a number of such cobbles showing a single or rarely more flakes struck in the line of the long axis of a cobble so as to produce a unifacial edge of the type shown. These exhibit medium damage. From Cutting 5, Area 2.
2. (5/333). Unifacial chopper-like cobble tool: bifacial examples are also found and these are essentially large heavy tools with indications of medium to very heavy edge damage. From Cutting 5, Area 2.

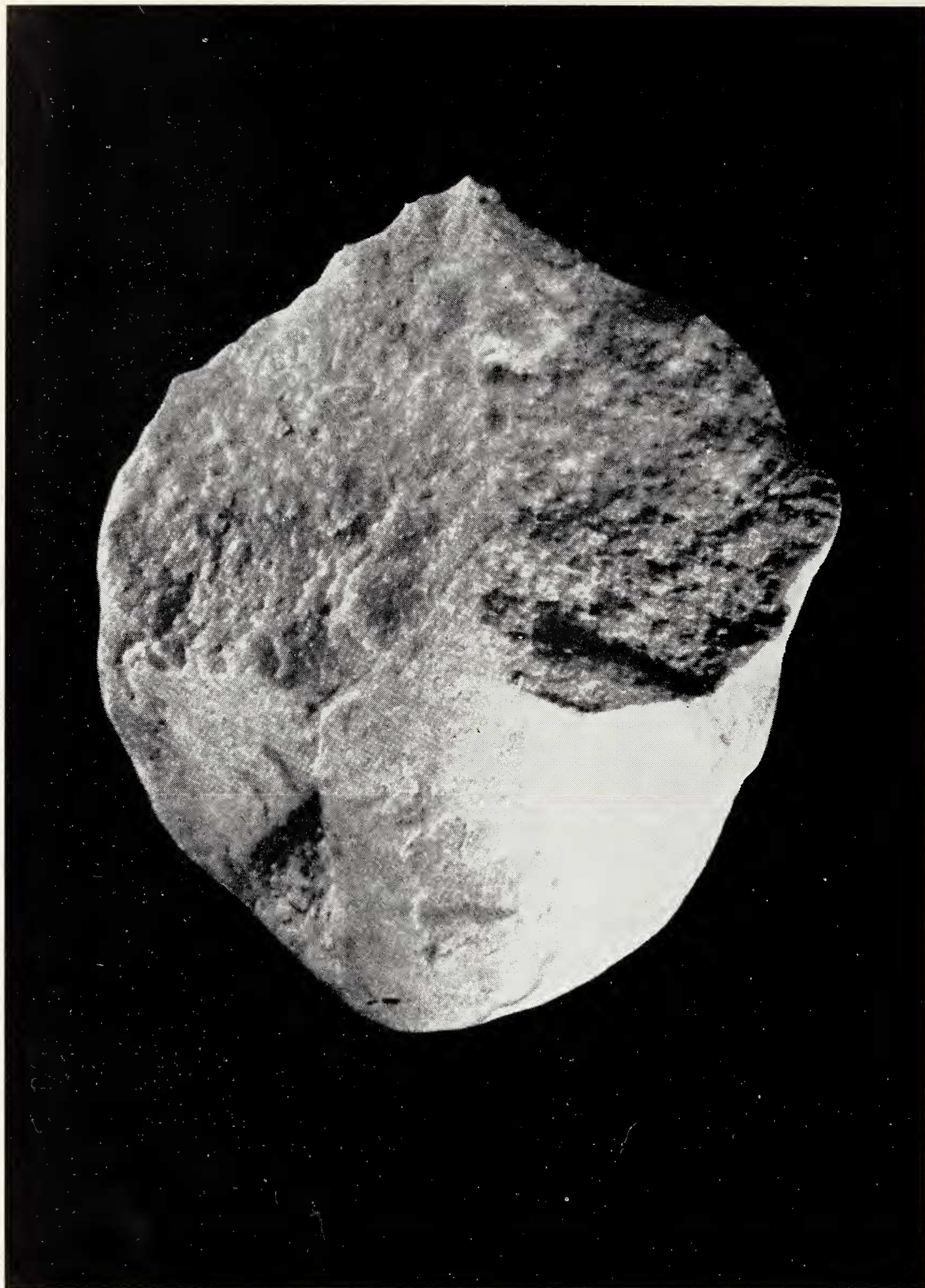


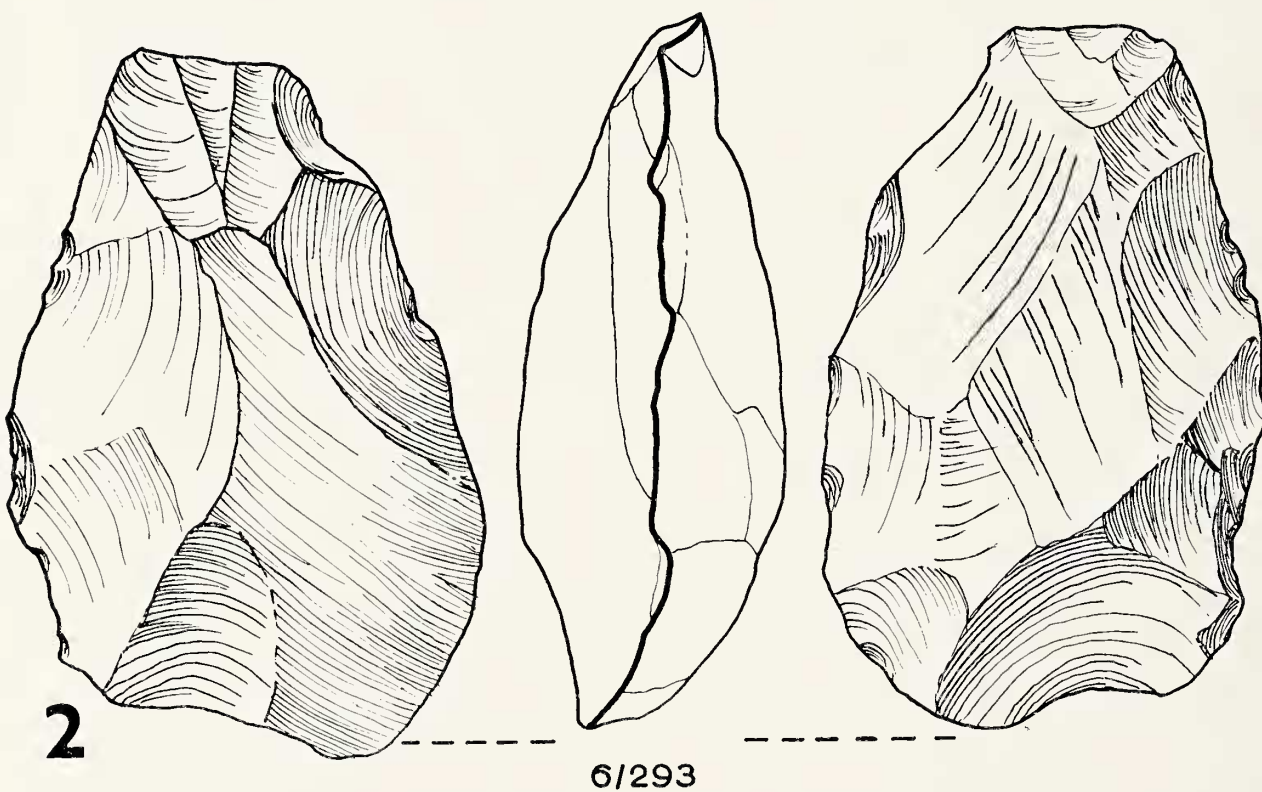
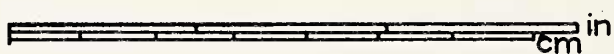
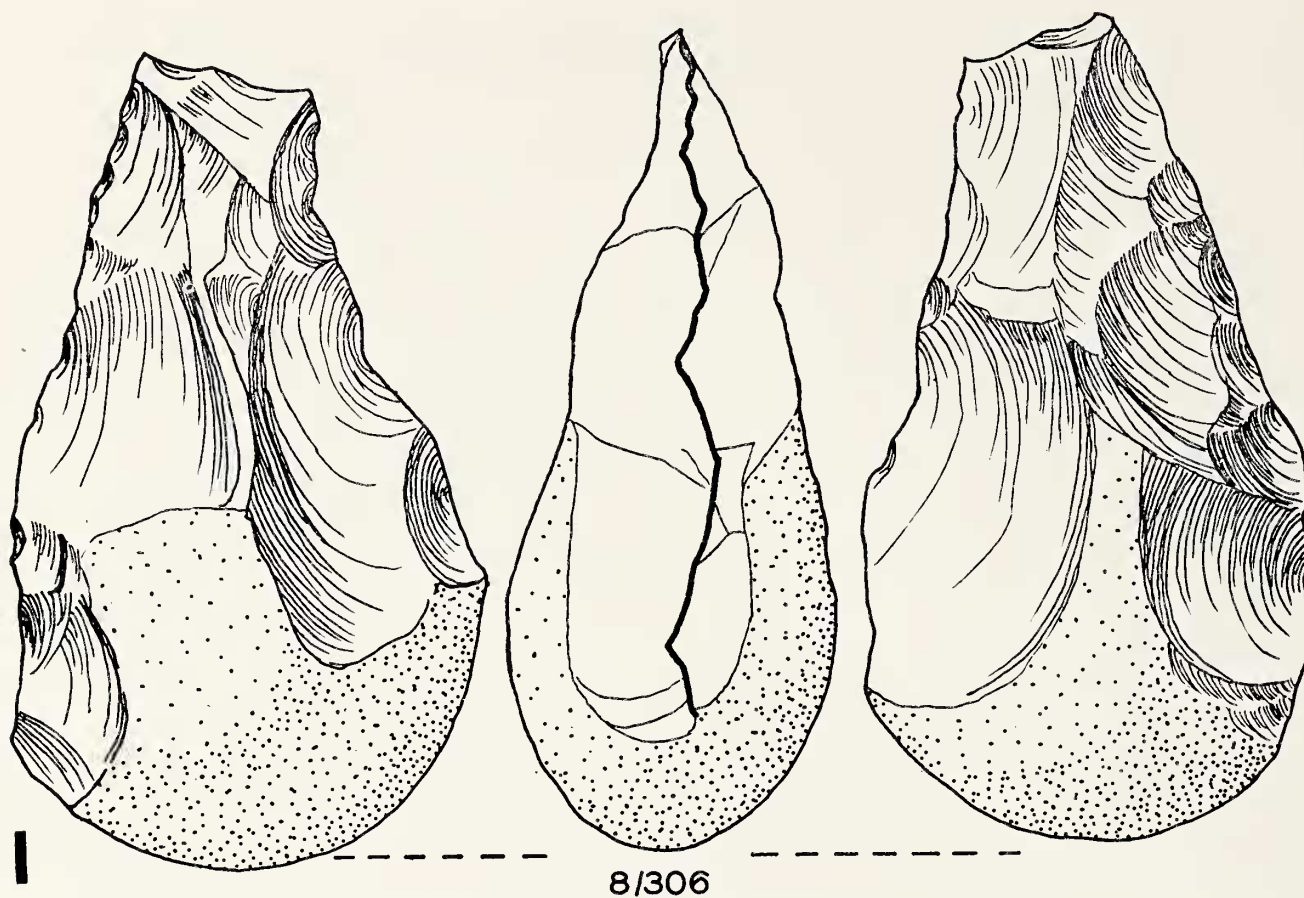
PLATE 19. AMANZI: Cobble Tool.

(C10/321) approx. $\times \frac{1}{8}$. A piece classified as a cobble tool, but showing the typical primary flaking on the under face of biface manufacture. On this specimen the face not shown is cortex and there is extensive utilization on the flaked edge. From Cutting 10, Area 1.

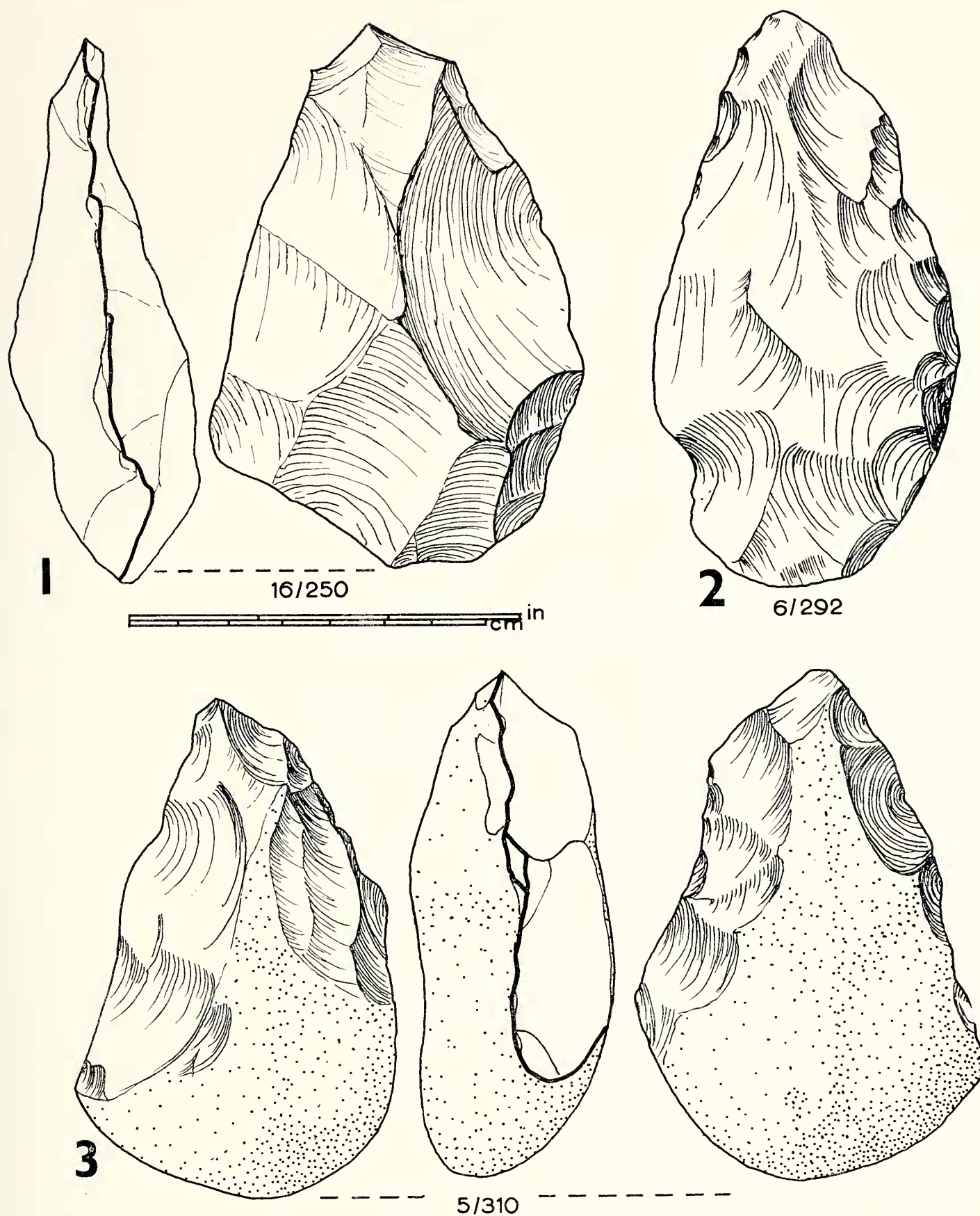


PLATE 20. AMANZI: Half-cobble.

(C10/333) $\times 1$. Viewed from vertically above the point and from the side, this pointed half-cobble is essentially an uncompleted hand-axe and the plate shows the position of the minor axis of the tool in relation to the half-cobble shape. This would appear to be a stage in a formal technique of handaxe manufacture that allows a tool, symmetrical about the minor axis, to be blocked out by primary flaking. From Cutting 10, Area 1.



PLATES 21-22- AMANZI: Handaxes.



PLATES 21-22. AMANZI: Handaxes.

(8/306, 16/250, 6/292, 6/293, 5/310). A series of five small handaxes which are on the lower limit of the size range in the class. These tools show a wider range of point trimming than in the handaxe class as a whole. The point in 6/293 has been retrimmed, presumably after breaking in manufacture or use. From Cutting 8, 6 and 5, Area 2.

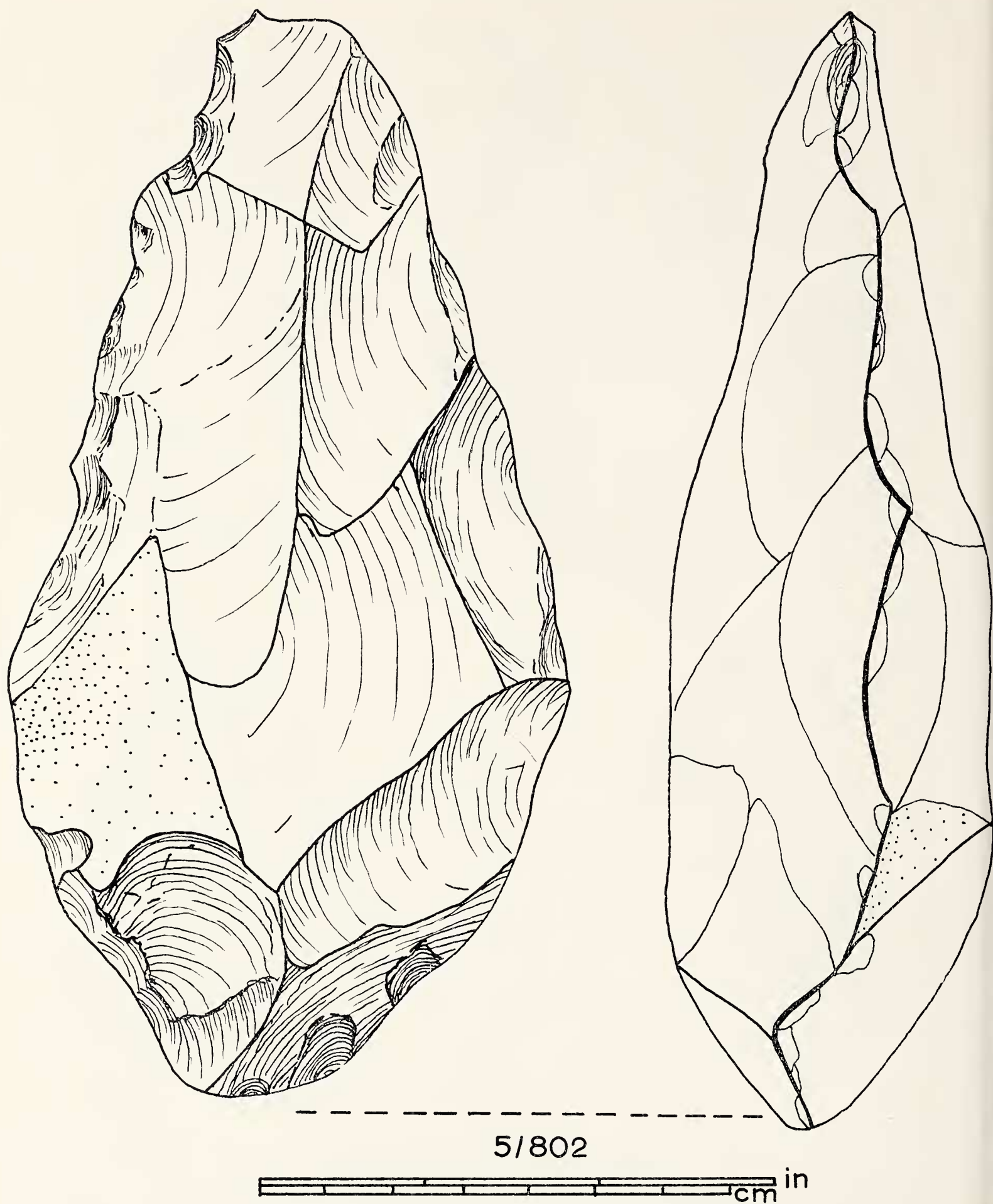


PLATE 23. AMANZI: Handaxe.

(5/802). A common long ovate or pear-shaped tool showing a thick minor section. The flaking on both faces is extensive and the tool is symmetrical about both axes. Cutting 5, Area 2.

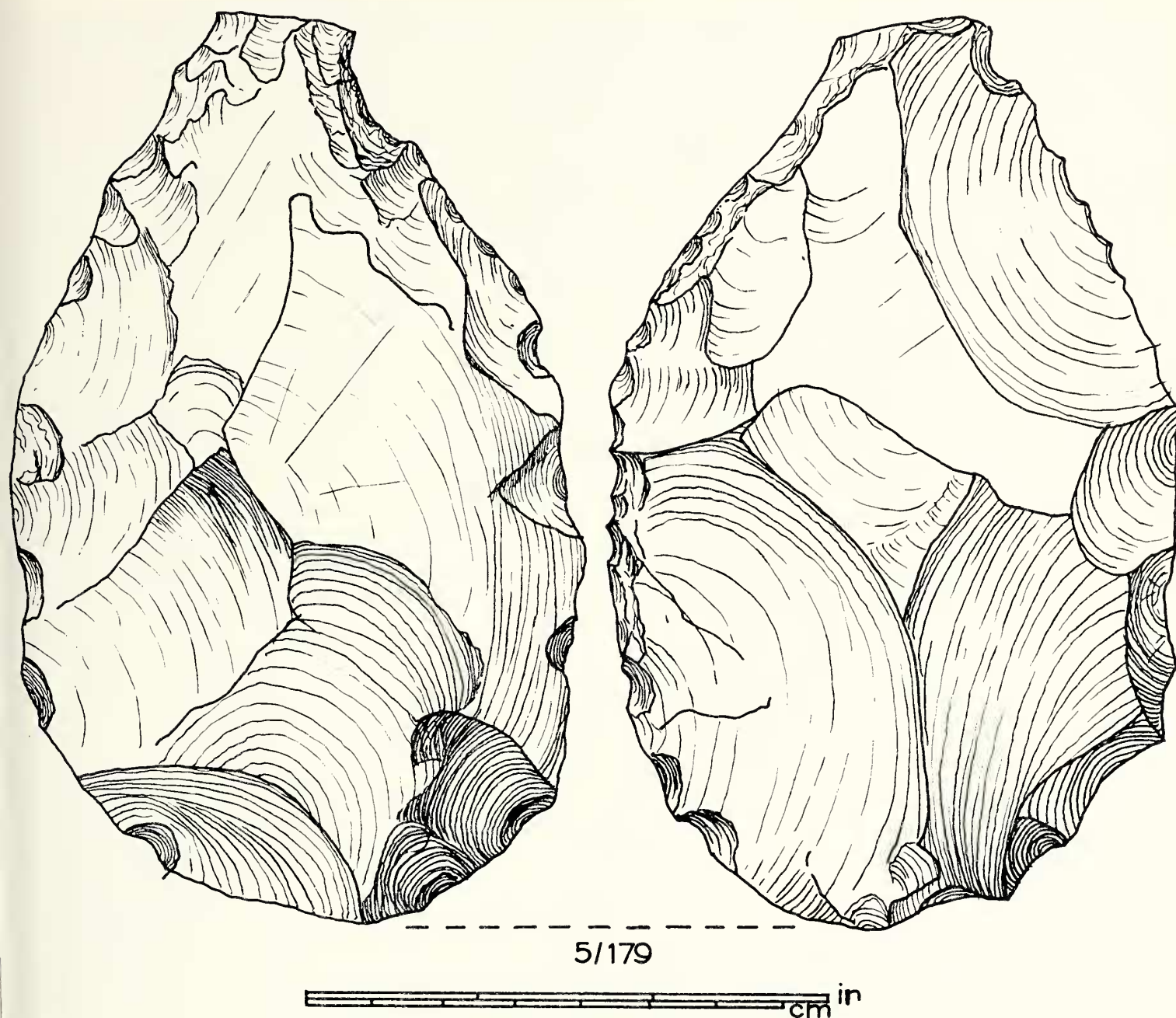


PLATE 24. AMANZI: Handaxe.

(5/179). In shape, this tool is on the extreme edge of the range towards the ovate form. The tip is broken and there is some emphasis on the lateral trimming along one edge. From cutting 5, Area 2.

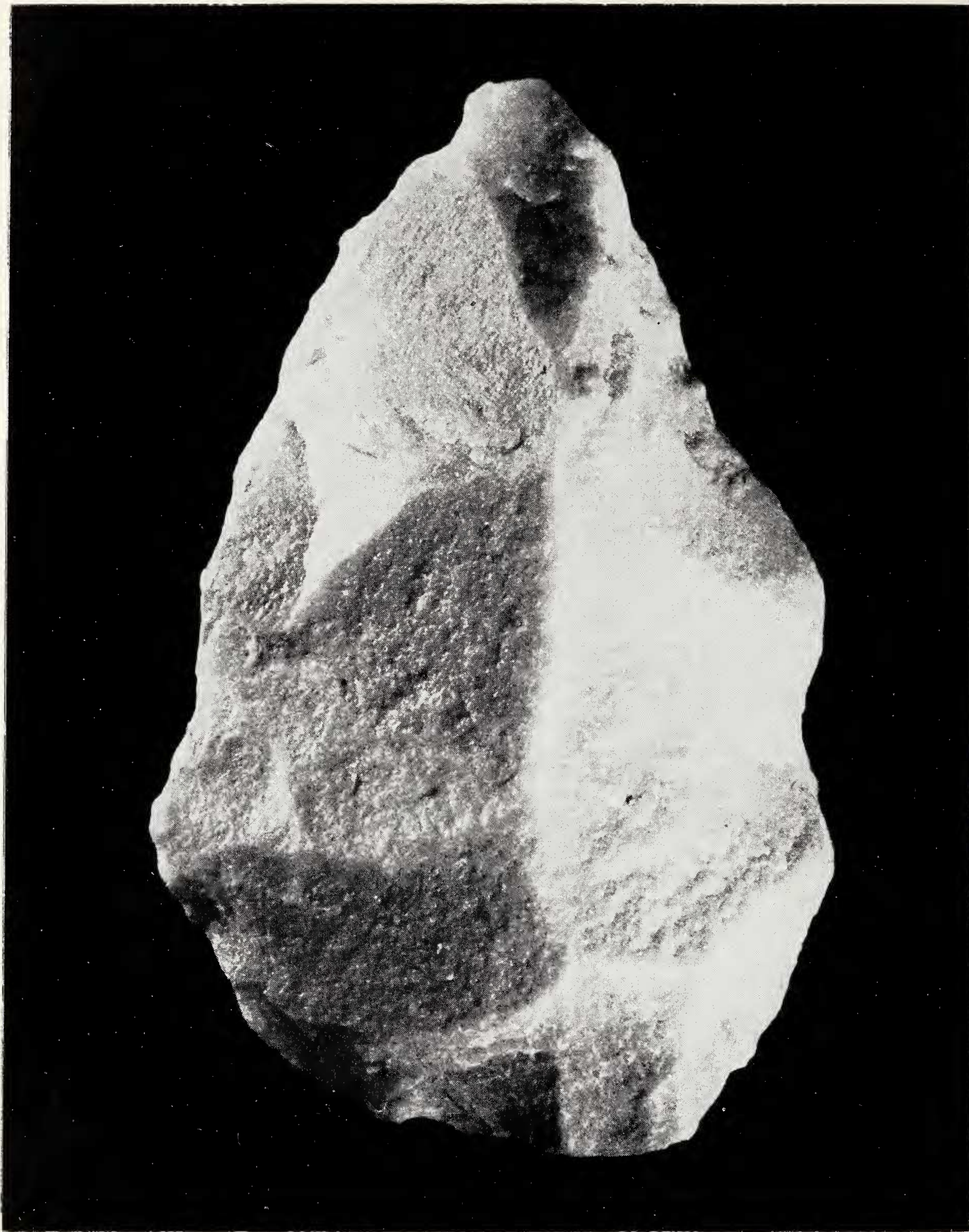


PLATE 25. AMANZI: Handaxe.

(5/476d) $\times \frac{5}{6}$. This is a common shape of handaxe and the flaking, though minimal, is over the whole of both faces. The point shows the three-flake scar pattern of the upper surface. The edges show little or no fine retouch and are formed by the intersection of the primary, shaping scars. The edges are thus not fine and they show medium damage. From Cutting 5, Area 2.



PLATE 26. AMANZI: Handaxe.

(C10/337) $\times \frac{5}{8}$. A handaxe made by the half-cobble technique showing the typical patch of cortex on the one side of the upper surface that is rarely removed. The keel to the tool is also characteristic. From Cutting 10, Area 1.

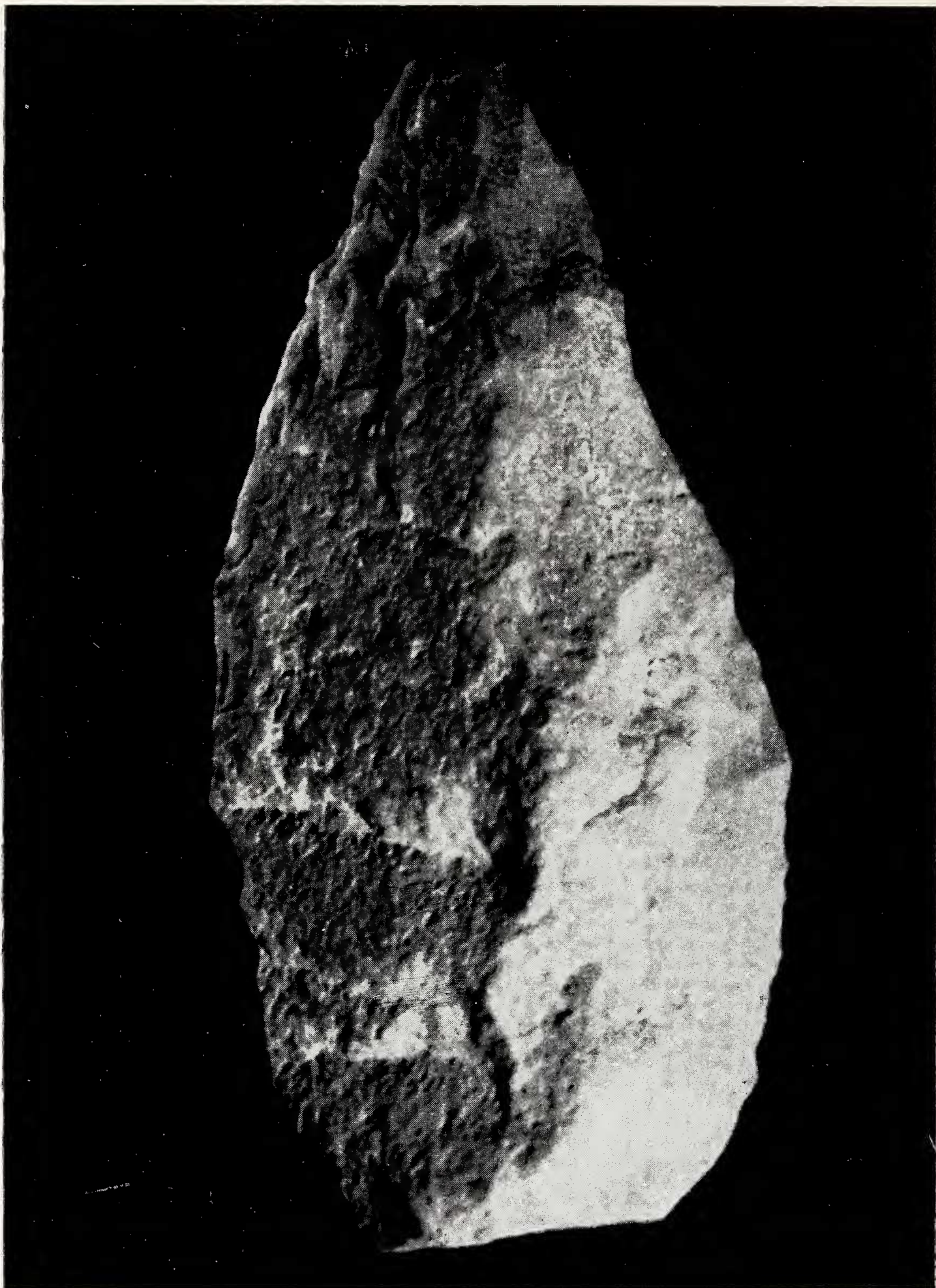


PLATE 27. AMANZI: Handaxe.

(6/463) $\times$ approx. $\frac{4}{5}$. A lanceolate handaxe, one of two similarly well finished specimens from Surface 1, Area 2, it is on the extreme end of the range towards the lanceolate form.



PLATE 28. AMANZI: Handaxe.

(5/406) $\times \frac{5}{6}$. An uncommon form of handaxe made on a side-struck flake. From Cutting 5, Area 2.



PLATE 29. AMANZI: Handaxe.

(5/547) $\times \frac{3}{4}$. Handaxe on a side-struck flake, there is little retouch on the edges of the tool. From Cutting 5, Area 2.

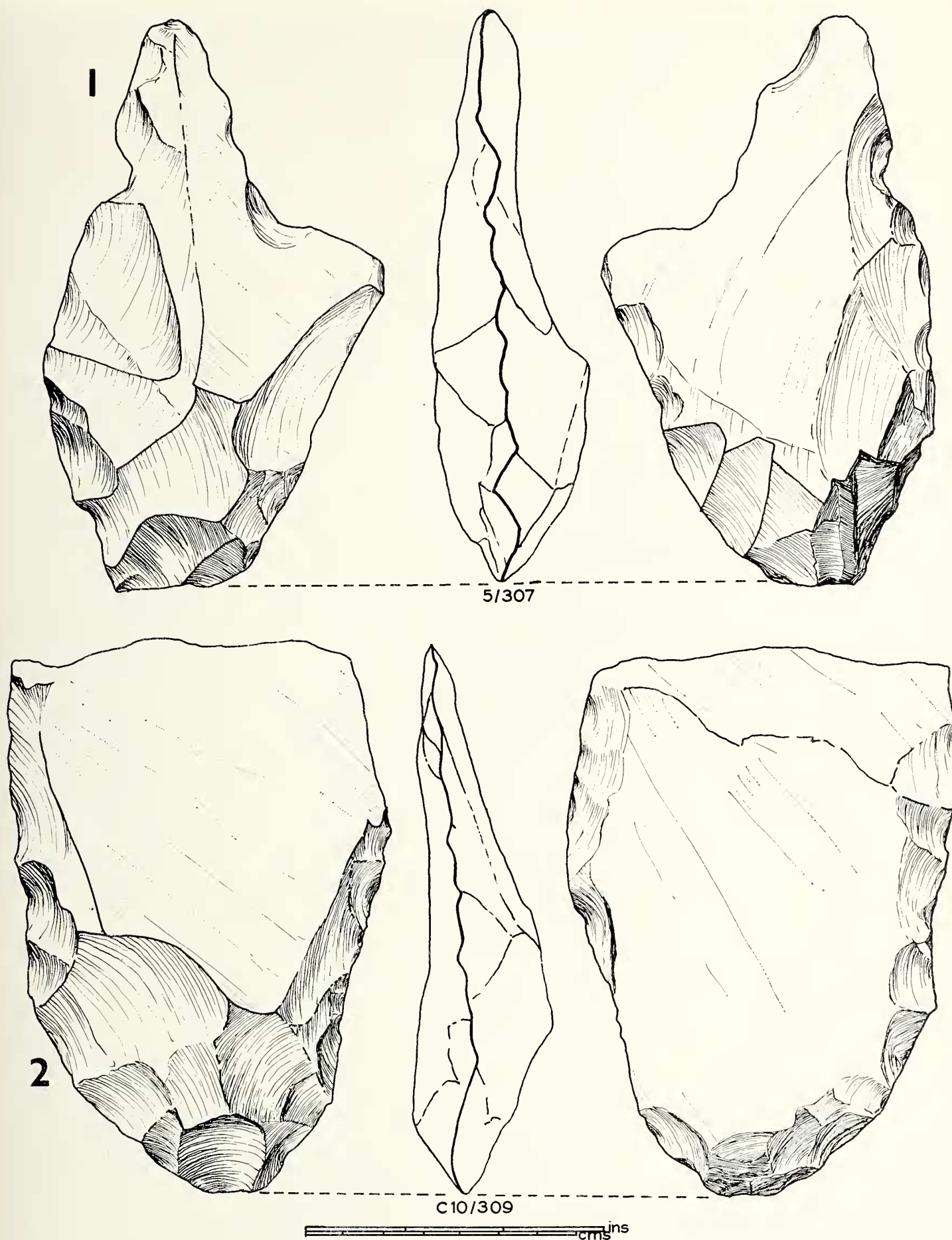


PLATE 30. AMANZI: Cleavers.

1. (5/307). Classified as a cleaver and showing a basic cleaver shape with the transverse edge notched, this is one of several similar tools from Area 2 which show this feature and suggesting use of these tools for some purpose outside the range of cleavers generally. From Cutting 5, Area 2.
2. (C10/309). Trapezoid plan form cleaver from Cutting 10, Area 1.



5/313



PLATE 31. AMANZI: Cleaver.

(5/313). One face of an end-notched cleaver, the notching here being due to the mode of usage which would appear to have been chopping rather than cutting. From Cutting 5, Area 2.

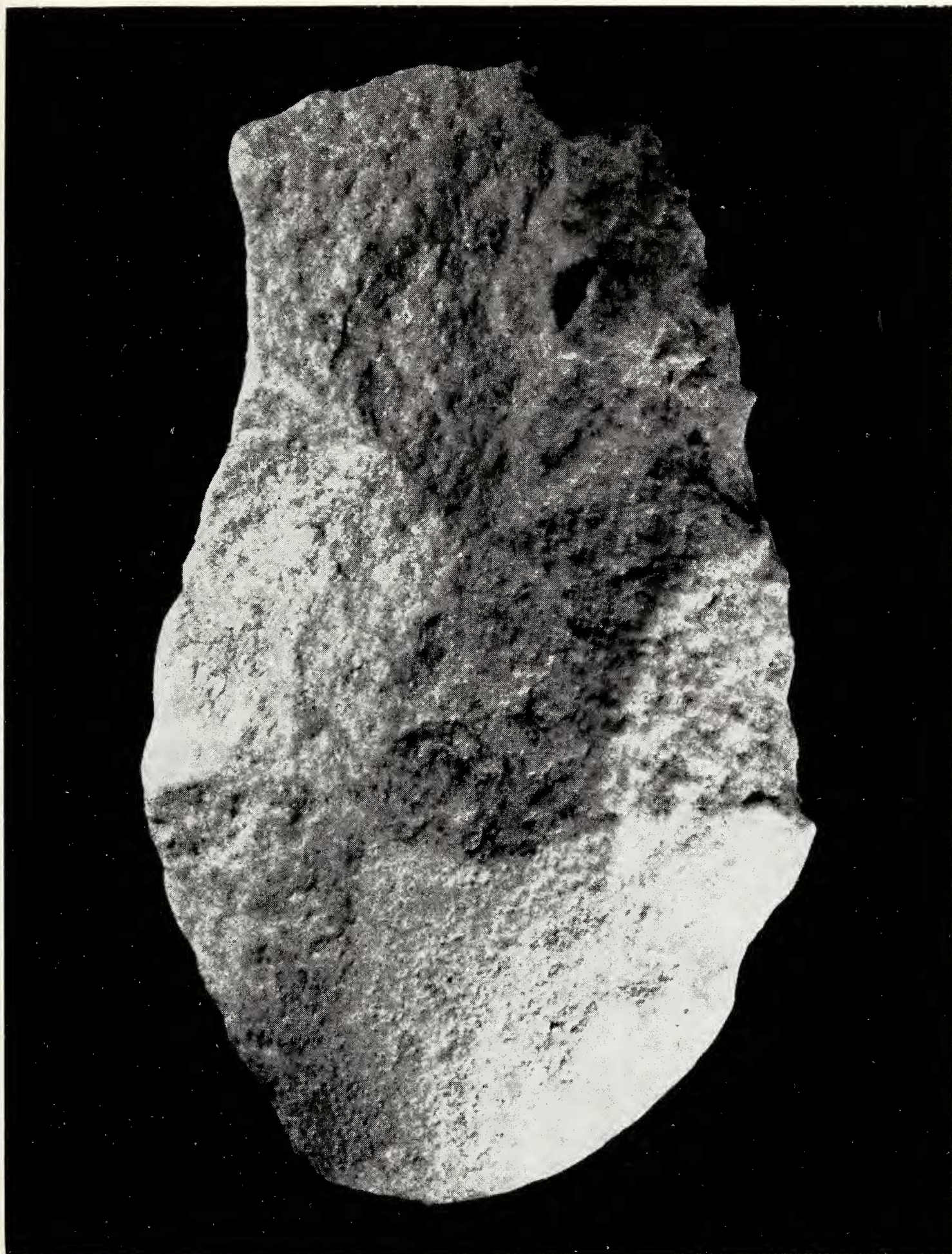


PLATE 32. AMANZI: Cleaver.

(C10/323) $\times \frac{4}{5}$. An unstandardized form on a side-struck flake. The transverse end shows some trimming and unifacial trimming extends up the right lateral. From Cutting 10, Area 1.



PLATE 33. AMANZI: Cleaver.
(C10/305) $\times \frac{4}{5}$. From Cutting 10, Area 1.

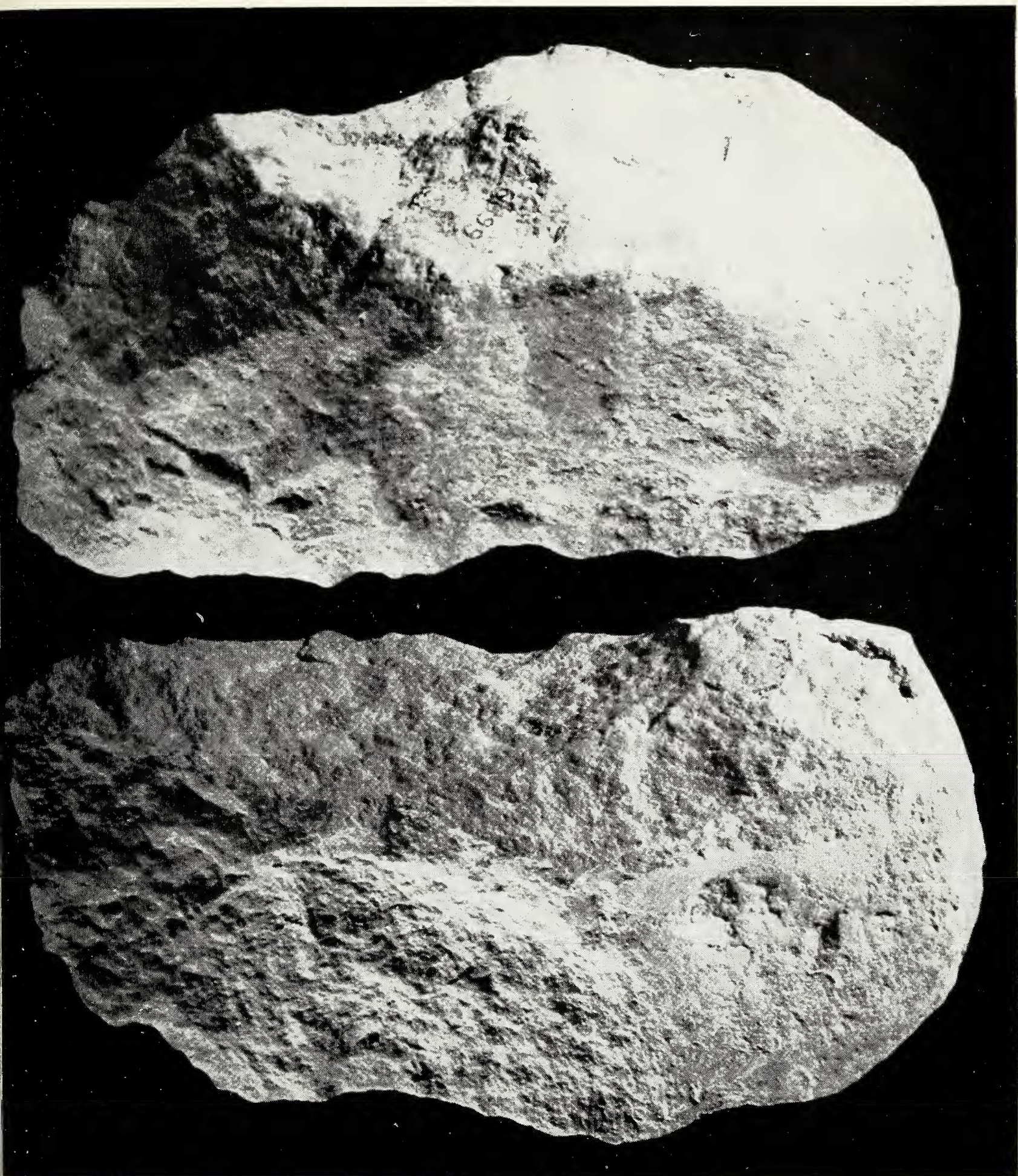


PLATE 34. AMANZI: Cleaver.

(6/199) $\times \frac{2}{3}$ approx. A large, heavy transverse-edged tool included in the cleaver class. From Cutting 6, Area 2.

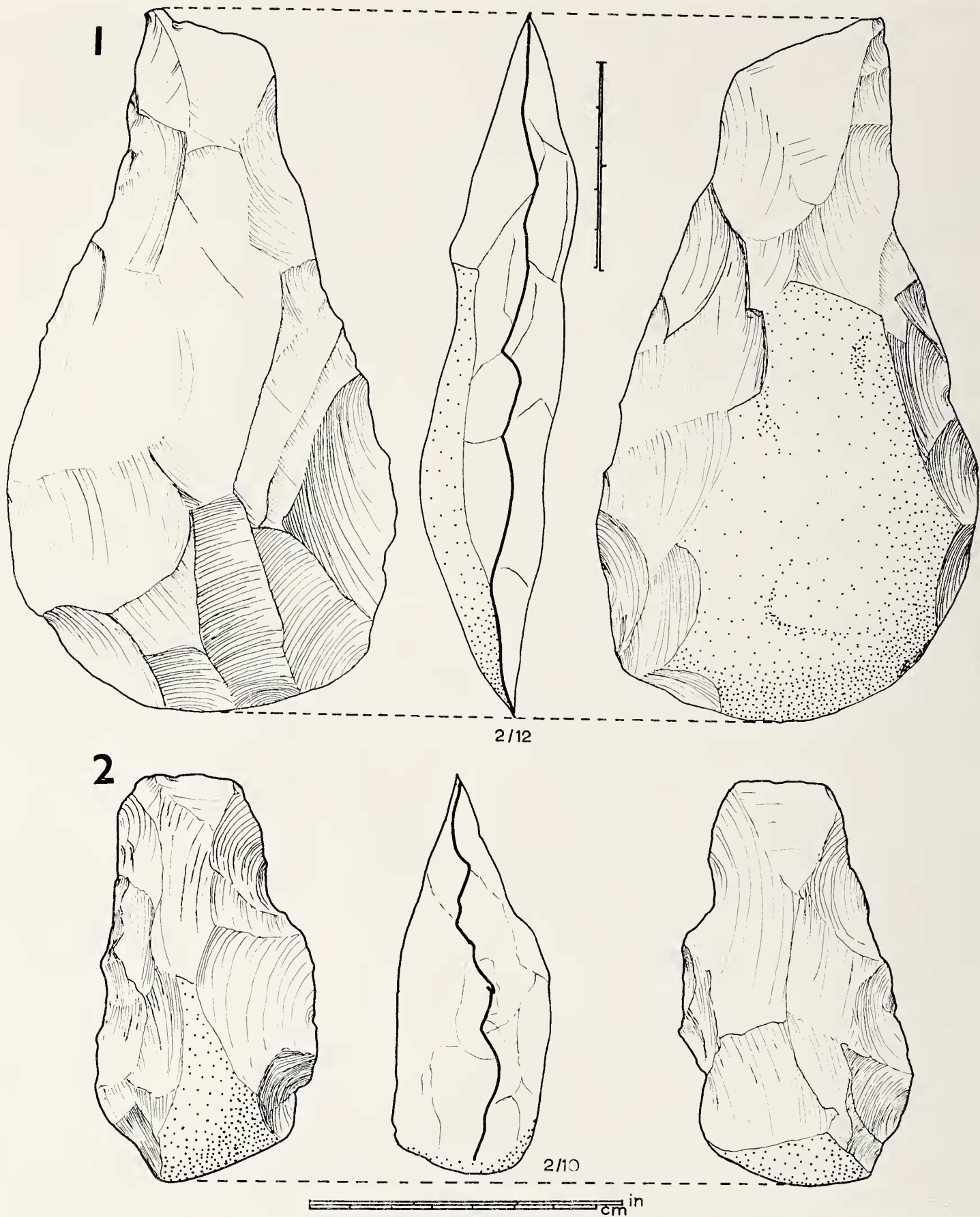


PLATE 35. AMANZI: Cleavers.

(2/10, 2/12). These two tools were found together with a larger cleaver and a handaxe on the white sands in Area 1, Square 2. The context was not obviously disturbed and a functional association is possible. The probability of such an association occurring by chance is very low. The two cleavers are of interest in their extremely narrow blades.

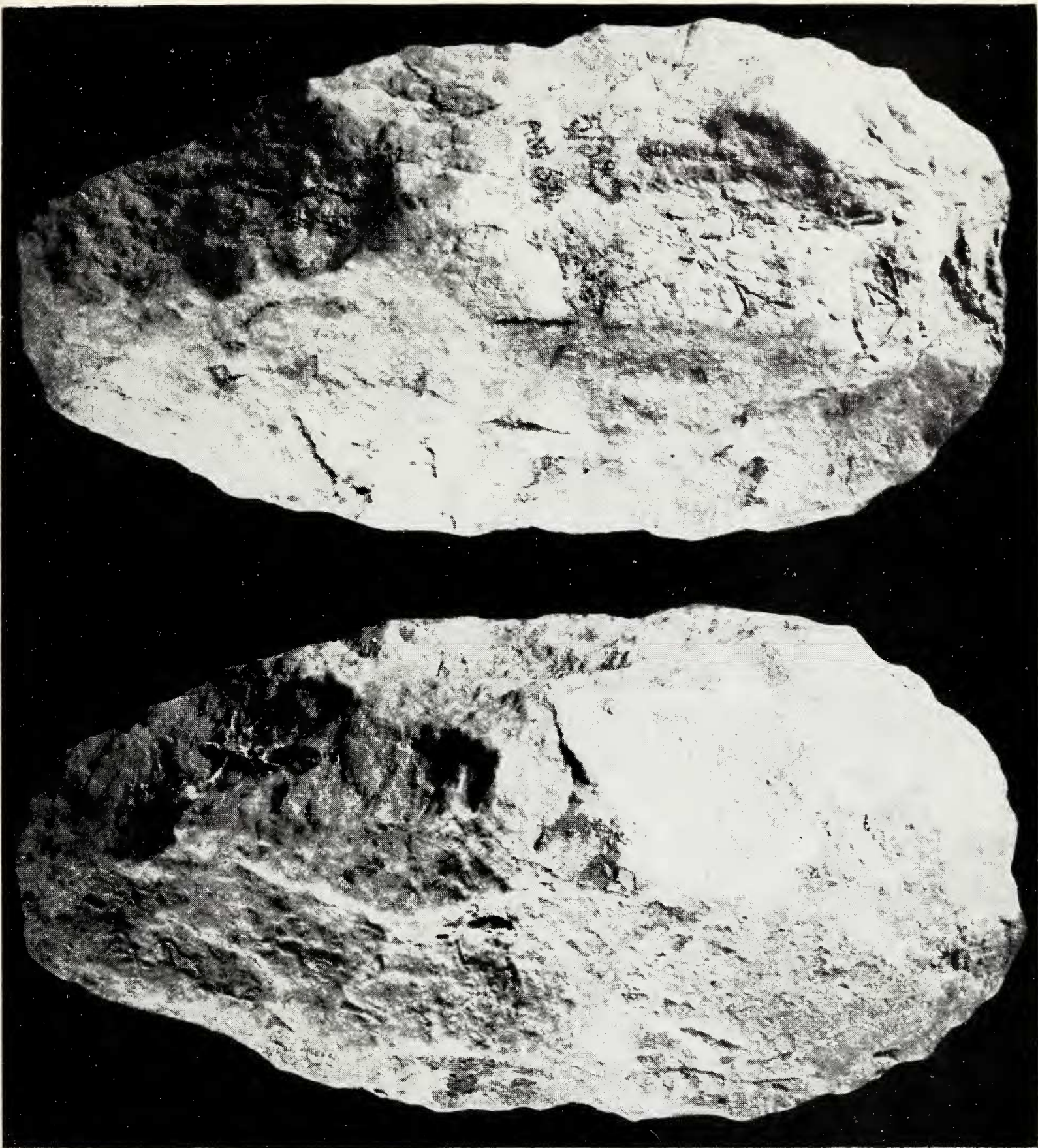


PLATE 36. AMANZI: Large Biface.

(5/527) $\times \frac{2}{3}$ approx. Round bitted biface—a limande-shaped symmetrical tool with a thick minor section, a definite butt and a broad rounded “point” and well trimmed lateral edges. The point is more specialized than indicated by the term “bit”, being slightly beaked. From Cutting 5, Area 2.

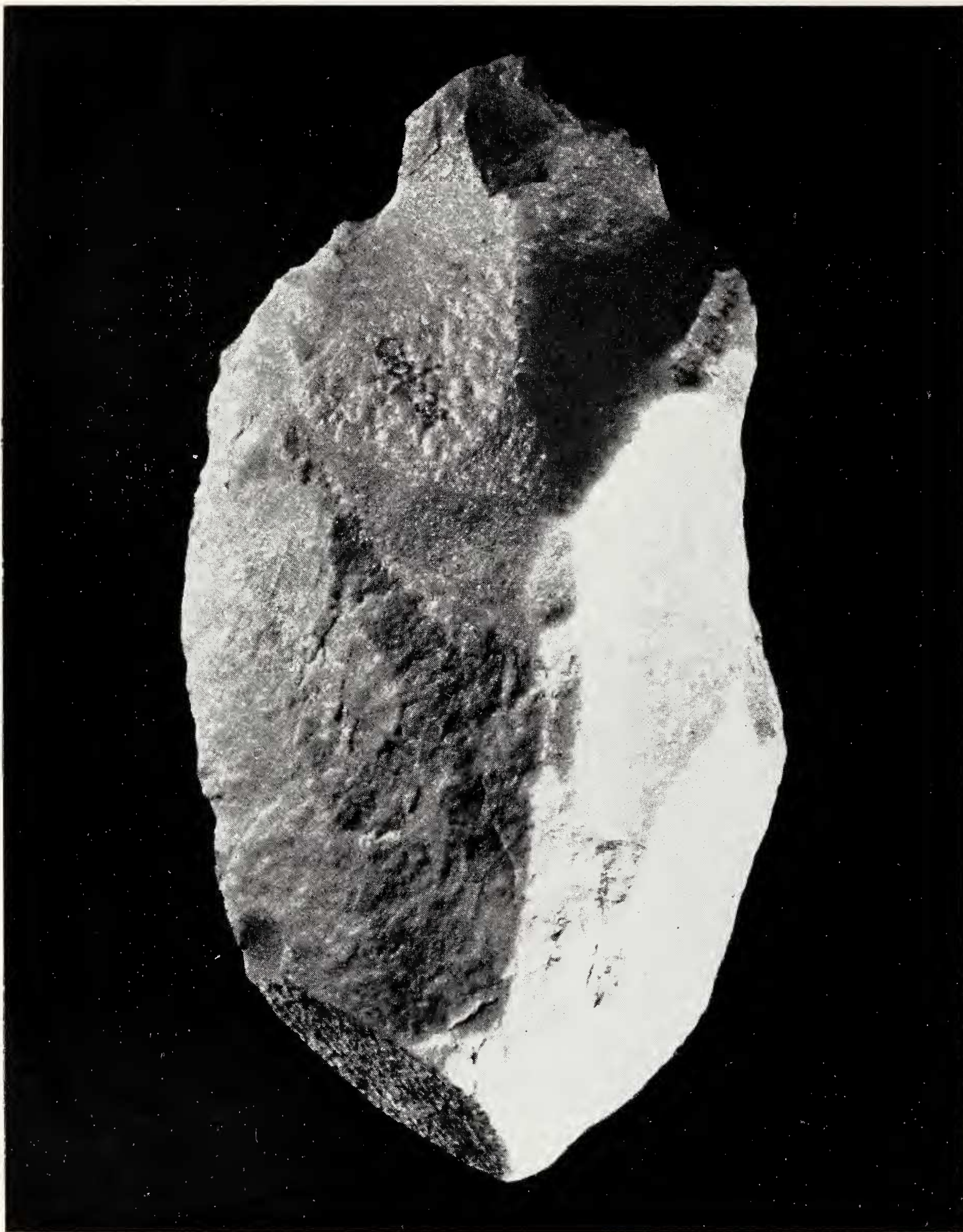


PLATE 37. AMANZI: Large Biface.

(C10/238) $\times \frac{4}{5}$. A high-backed tool with the base a flat main flake surface, it lacks the symmetry of a handaxe and also the sharp lateral edges. The tool has been pointed by a series of flakes on the dorsal surface. From Cutting 10, Area 1.



PLATE 38. AMANZI: Large Biface.

(6/179) $\times \frac{4}{5}$. This tool shows no trimming on the point, but extensive step flaking down the left lateral edge which would seem to be marked by medium to heavy damage. From Cutting 6, Area 2.

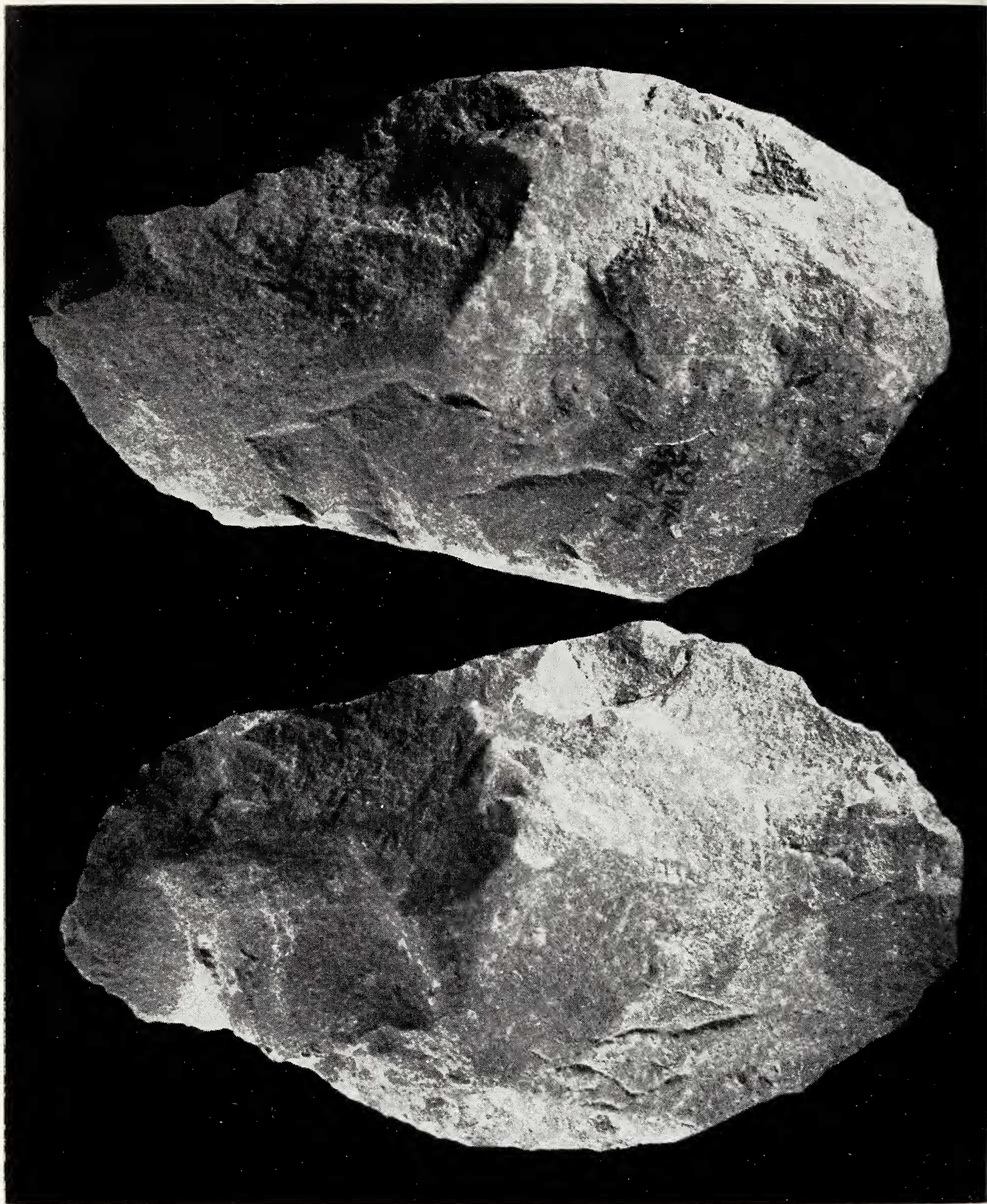


PLATE 39. AMANZI: Large Biface.

(16/292) $\times \frac{3}{5}$. An elongated biface with an obtuse, thin-edged point and utilization damage extending around the point and along both laterals. From Cutting 6, Area 2.

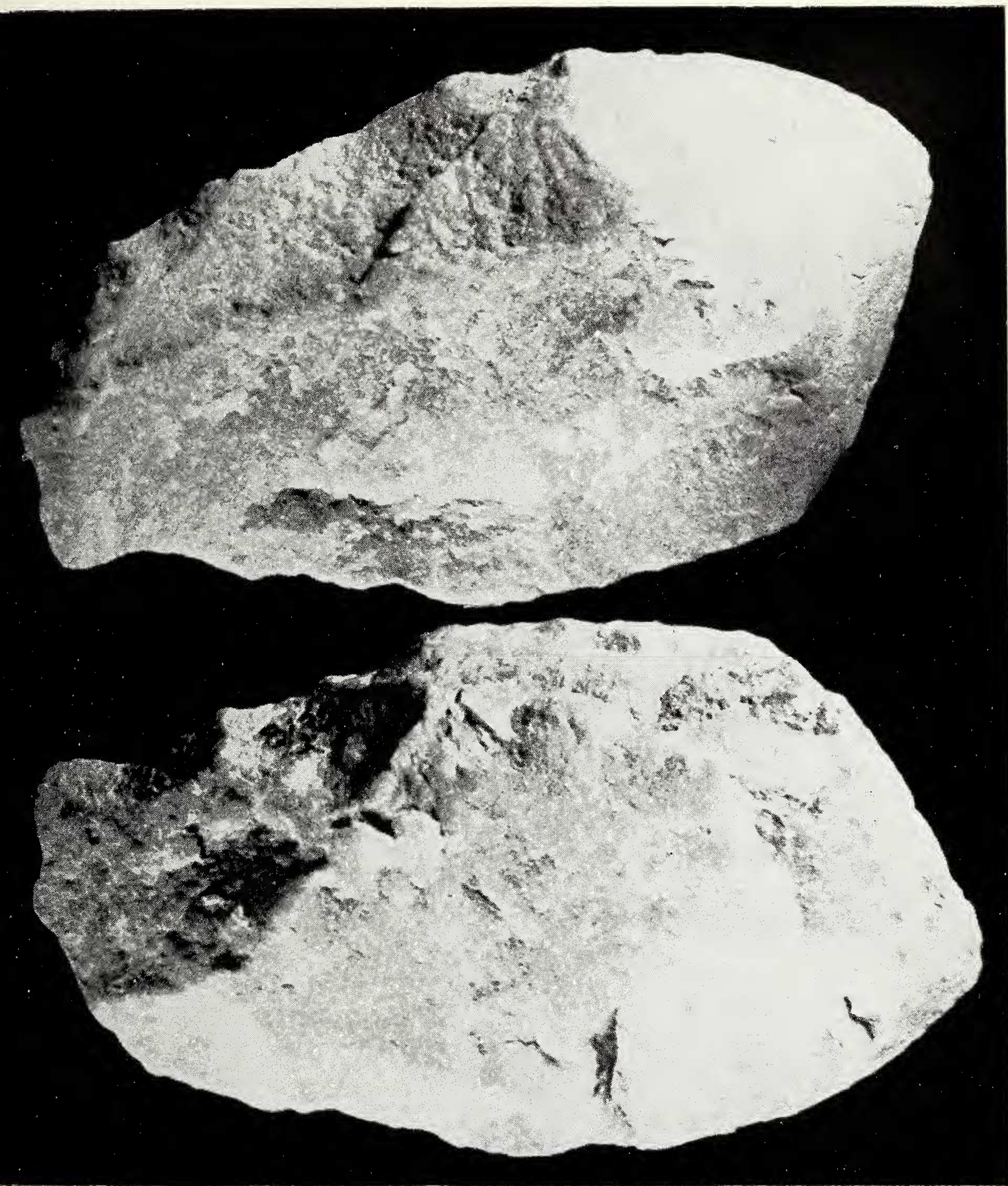


PLATE 40. AMANZI: Large Biface.

$(8/320) \times \frac{2}{5}$. An elongated biface with a steep, curved, trimmed point and fine lateral edge trimming. From Cutting 8, Area 2.

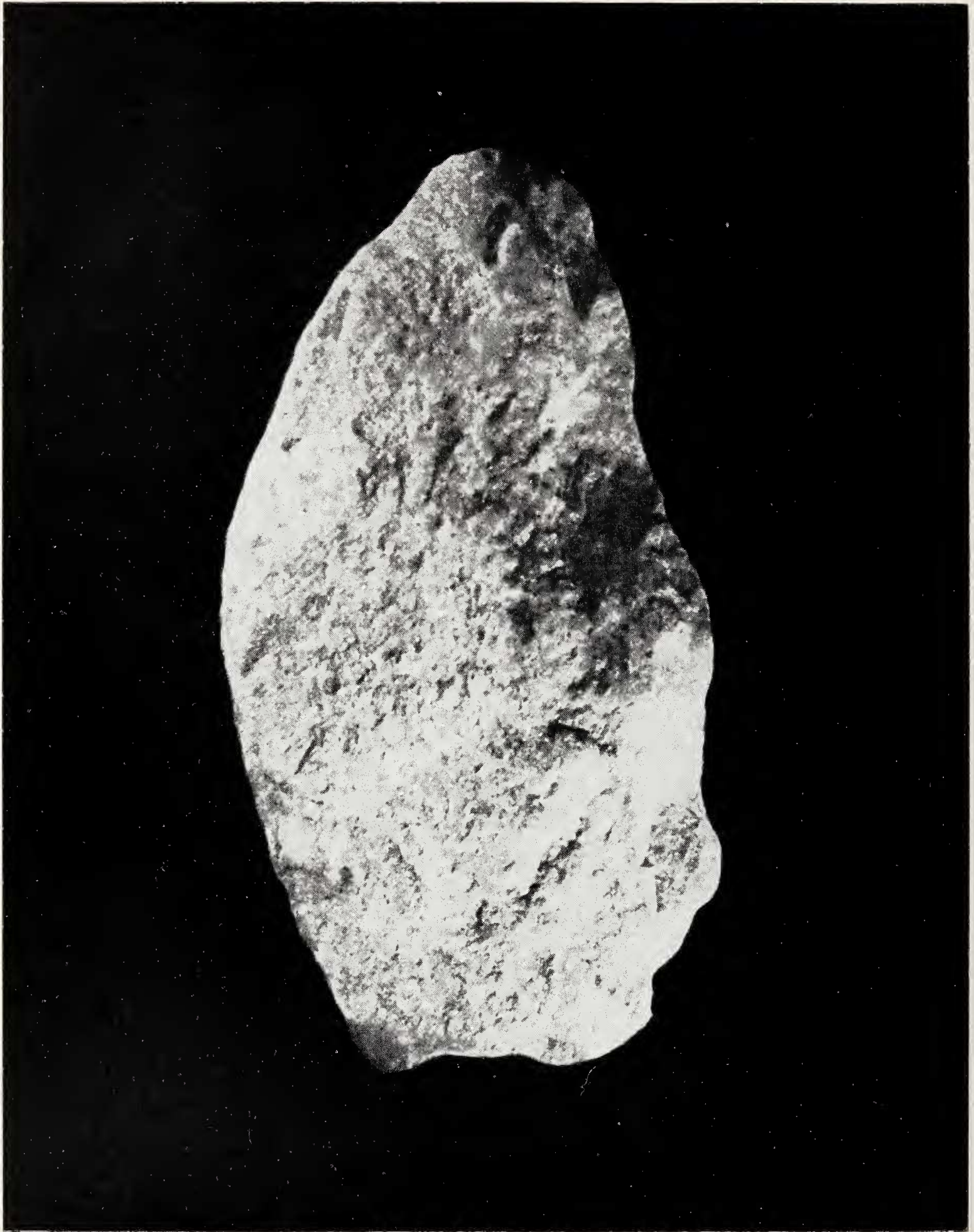


PLATE 41. AMANZI: Large Biface.

(5/593) $\times \frac{5}{6}$. An edge-trimmed biface, asymmetrical and unpointed. From Cutting 5, Area 2.

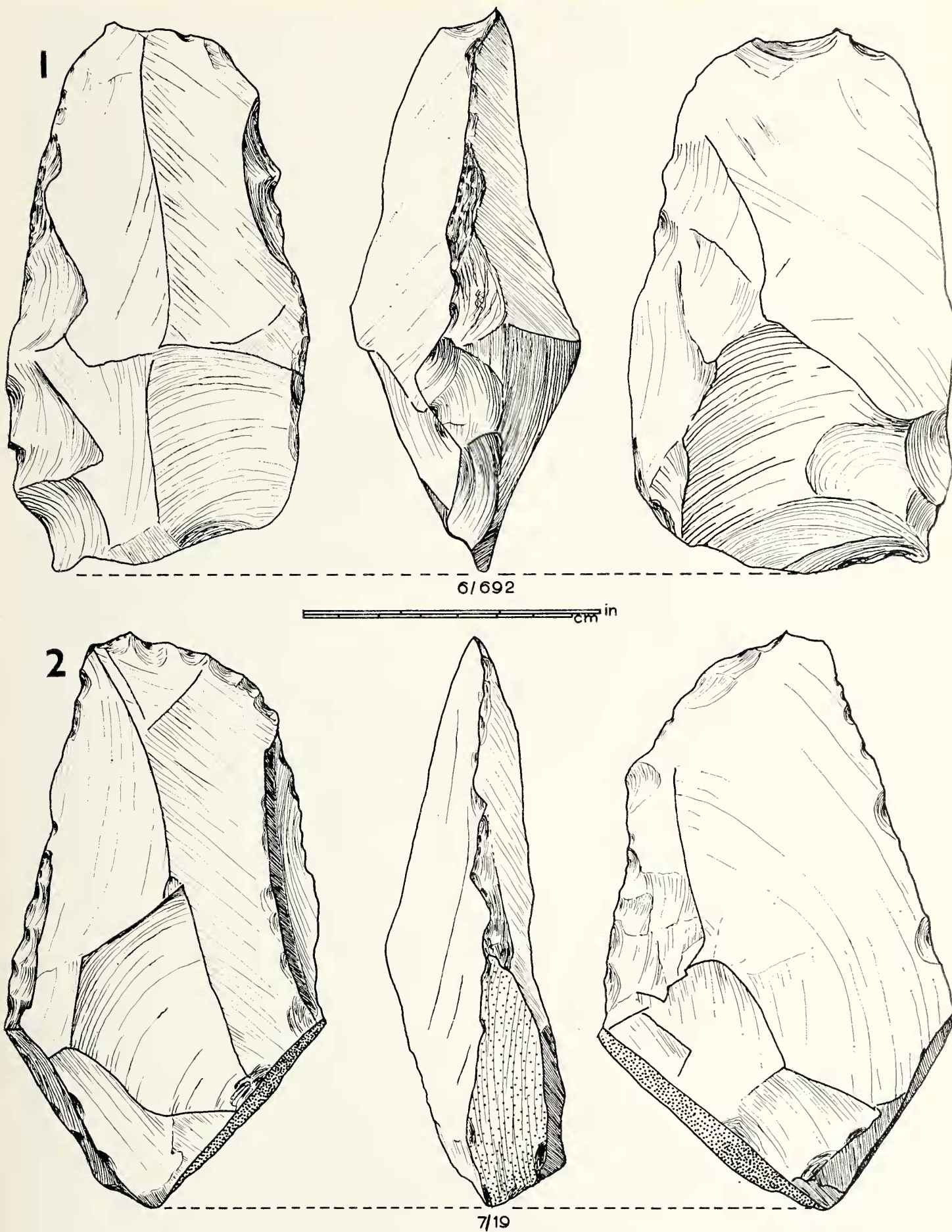


PLATE 42. AMANZI: Other Tools.

(6/692, 7/19). Transverse-edged, flat based, highbacked tools or "wedges". These illustrations show the primary flake form of this subclass, the trimming around the transverse edge and on the laterals. From Cuttings 6 and 7, Area 2.

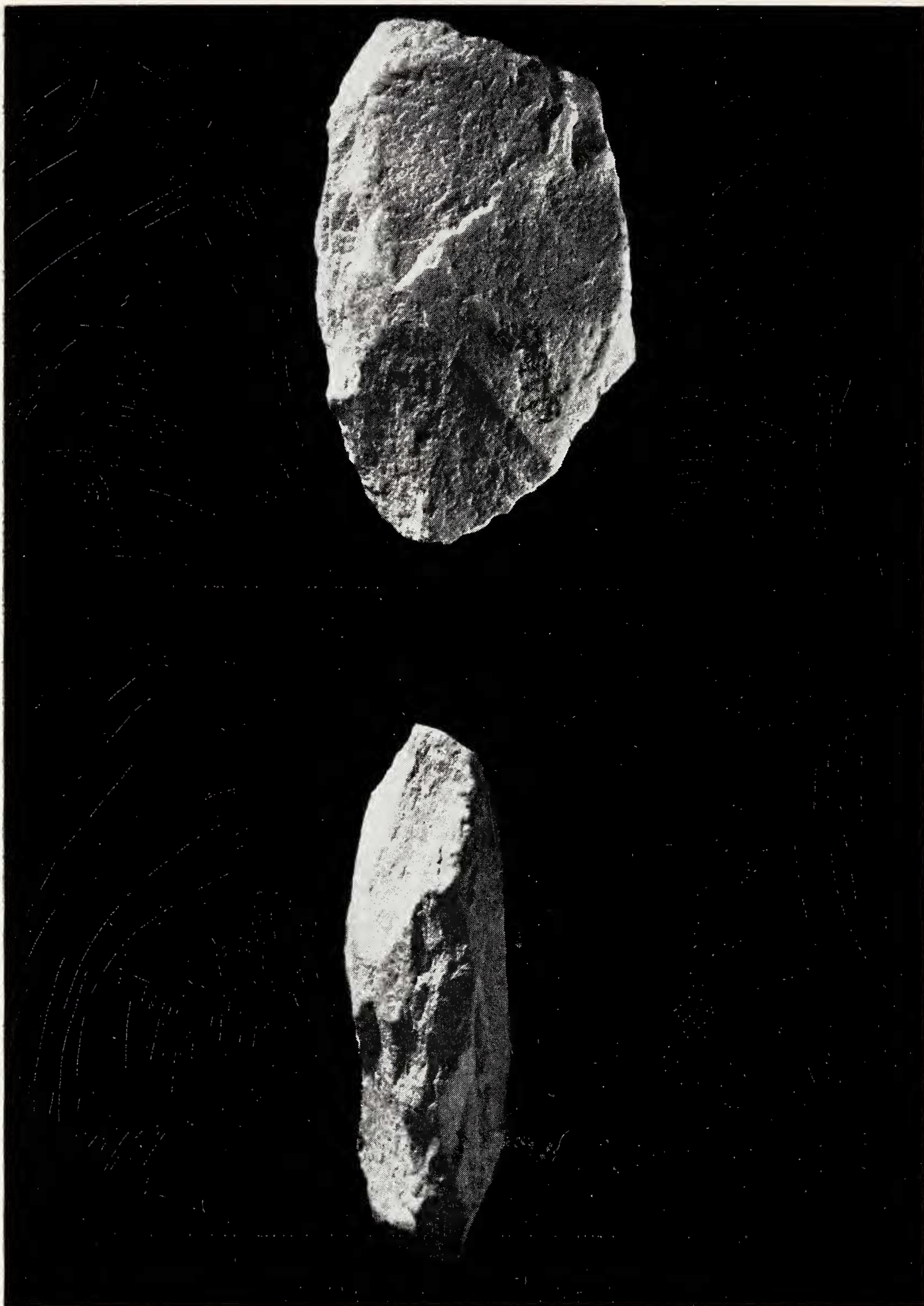


PLATE 43. AMANZI: Other Tools.

(8/450) $\times \frac{2}{3}$. An example of a small bifacial tool with trimming down one side which is more adze-like than what is classified here as scraper retouch. The term "adze" used to describe these tools is provisional and some other term with less functional overtones would be preferable. As used here the term has no functional implications. From Cutting 8, Area 2.

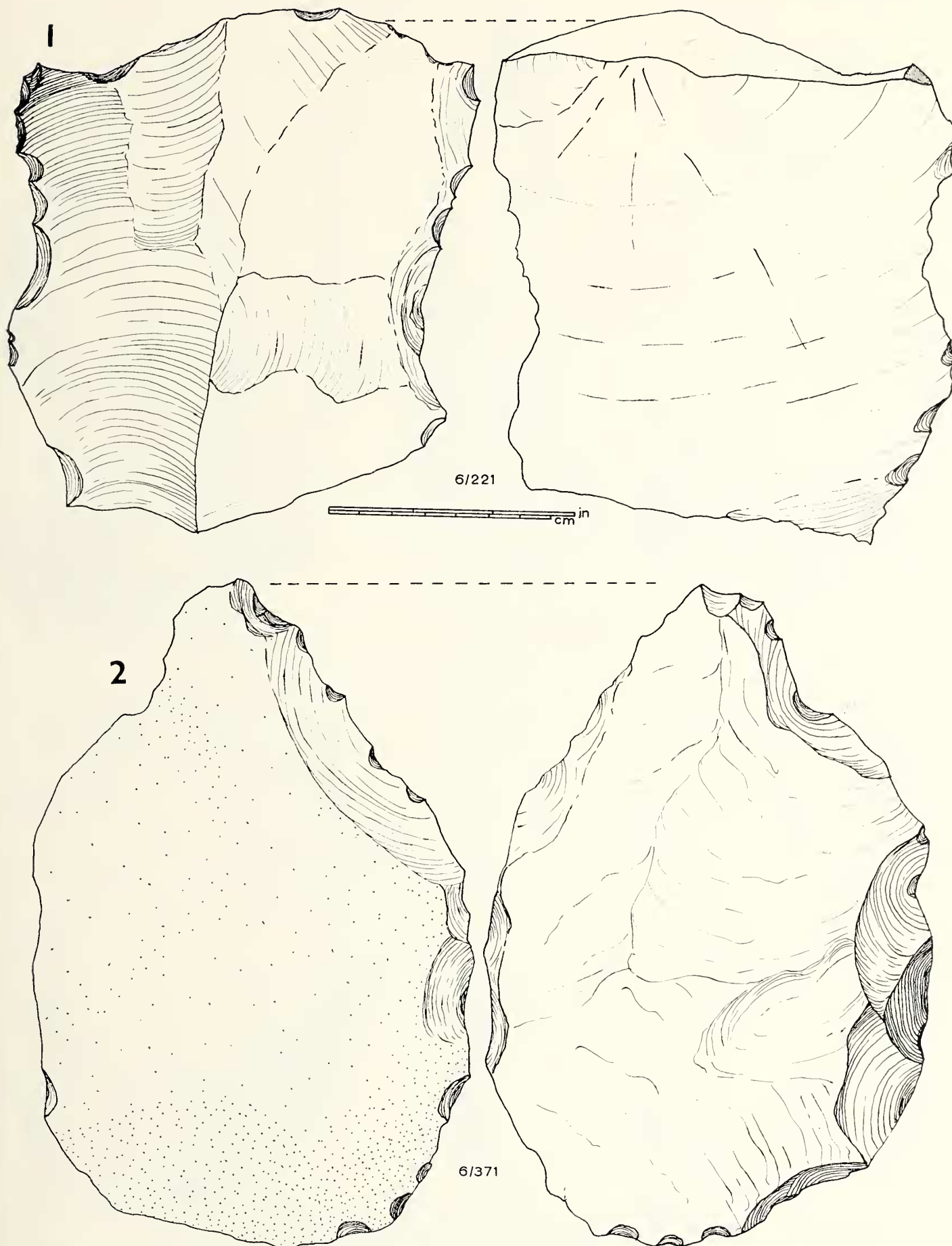


PLATE 44. AMANZI: Flakes.

1. (6/221). Two faces of a large (greater than 100 mm.) modified flake. From Cutting 6, Area 2.
2. (6/371). Two faces of a large primary modified flake.

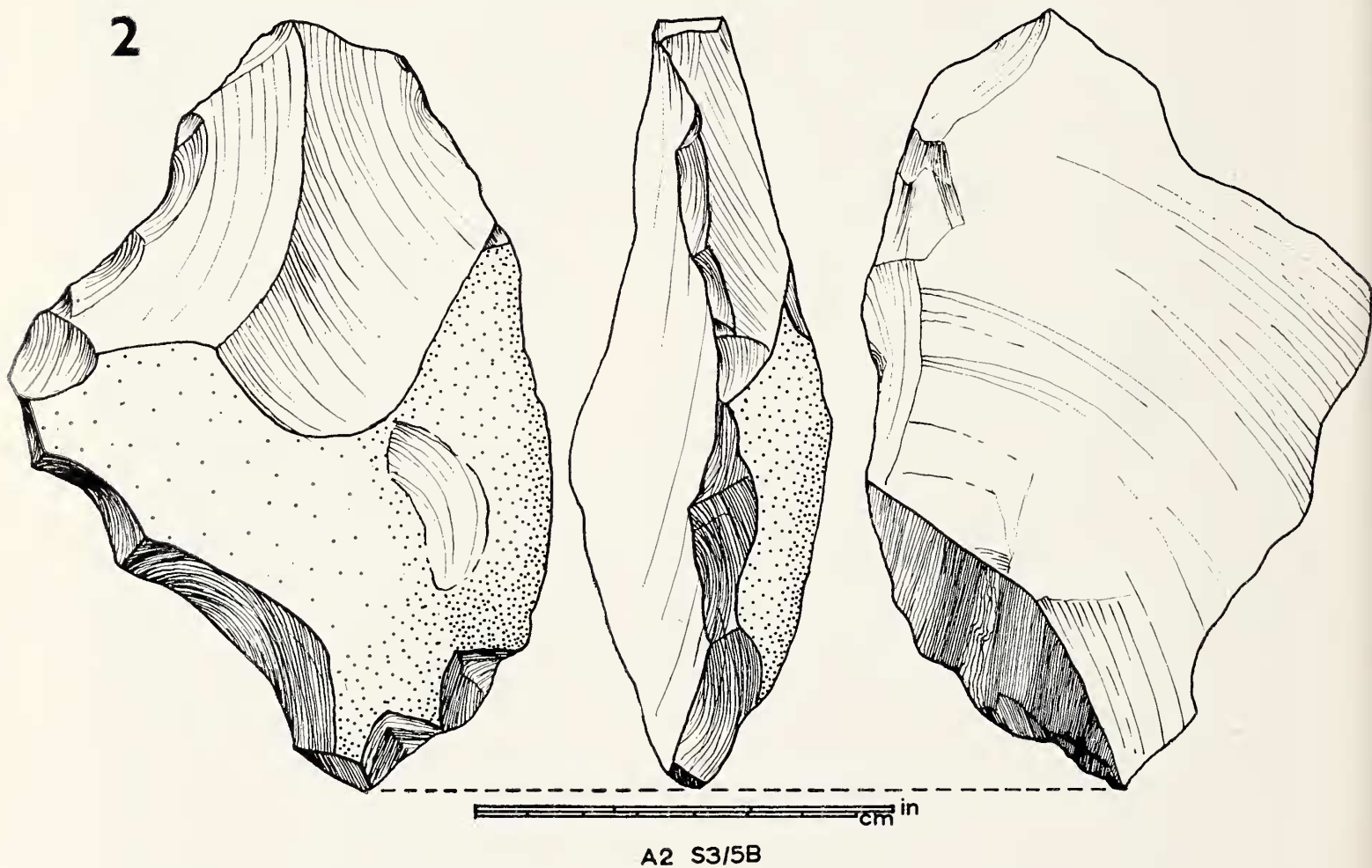
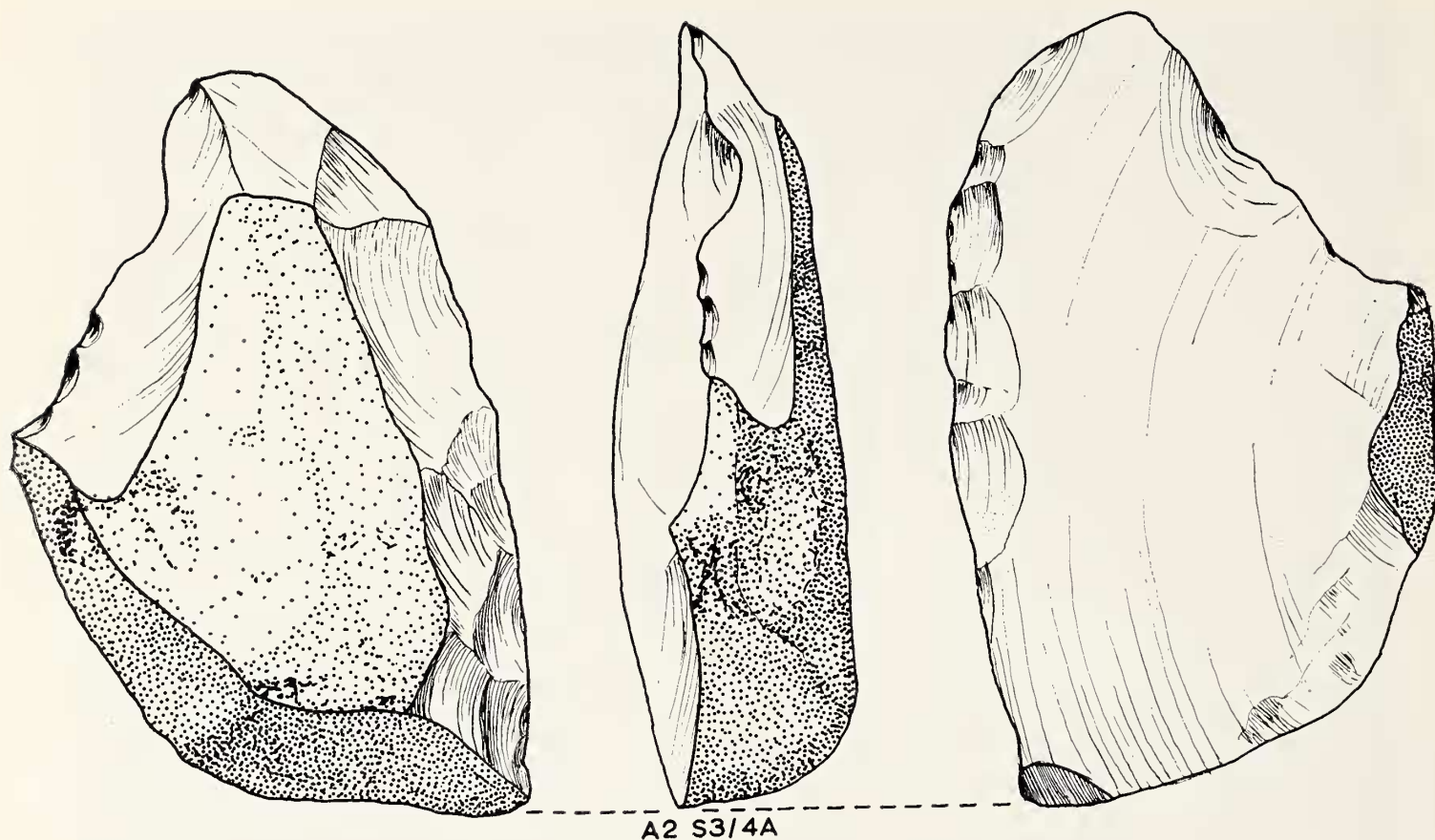


PLATE 45. AMANZI: Flakes.

(A2S3/4A, A2S3/5B). Two large flakes from the Deep Sounding, Area 2, Surface 3, showing scraper retouch on the working edges.

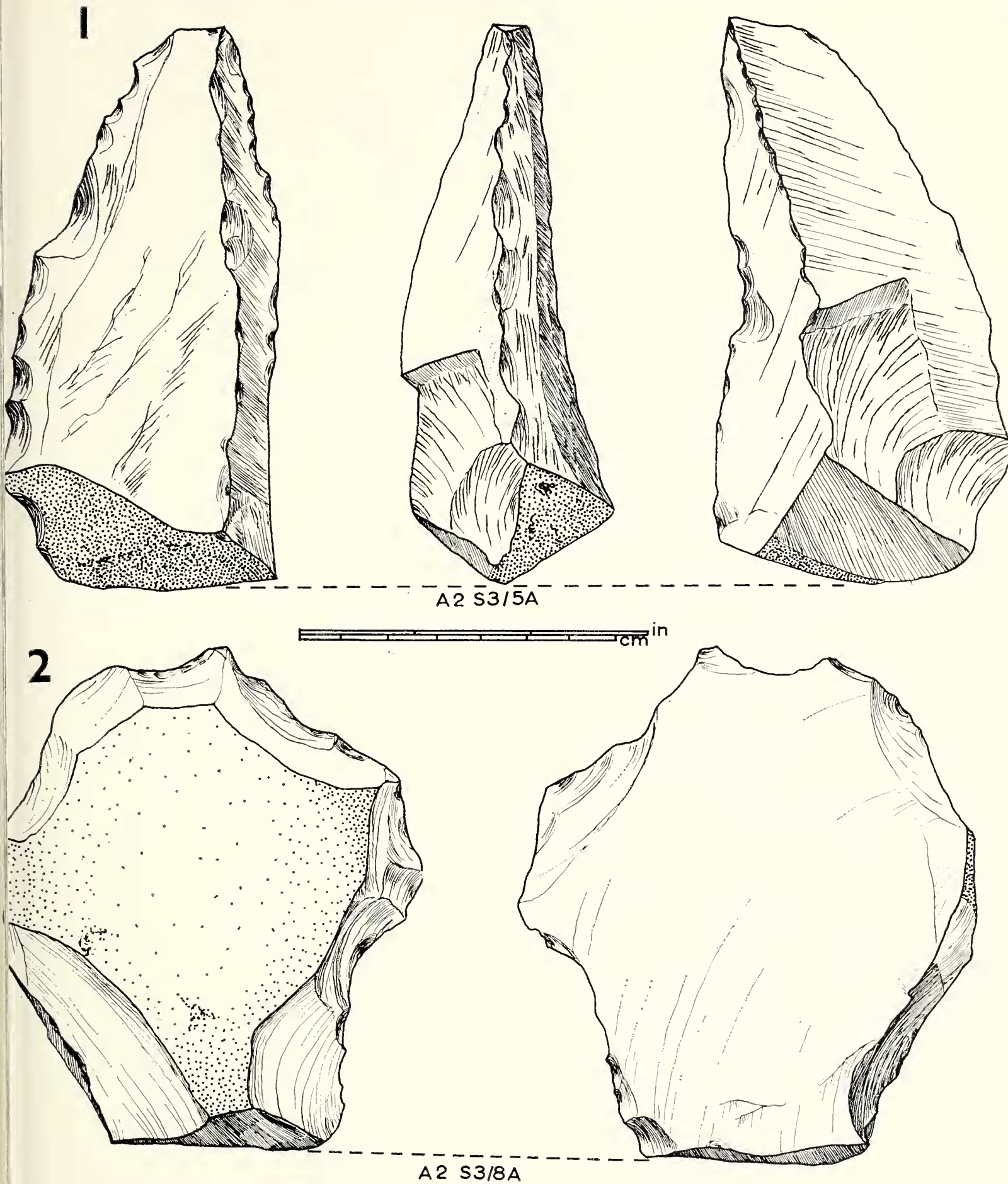


PLATE 46. AMANZI: Flakes.

1. (A2S3/5A). A large flake showing extensive shallow trimming on the lateral edge. From Surface 3, Deep Sounding, Area 2.
2. (A2S3/8A). Large flake with scraper retouched margin.

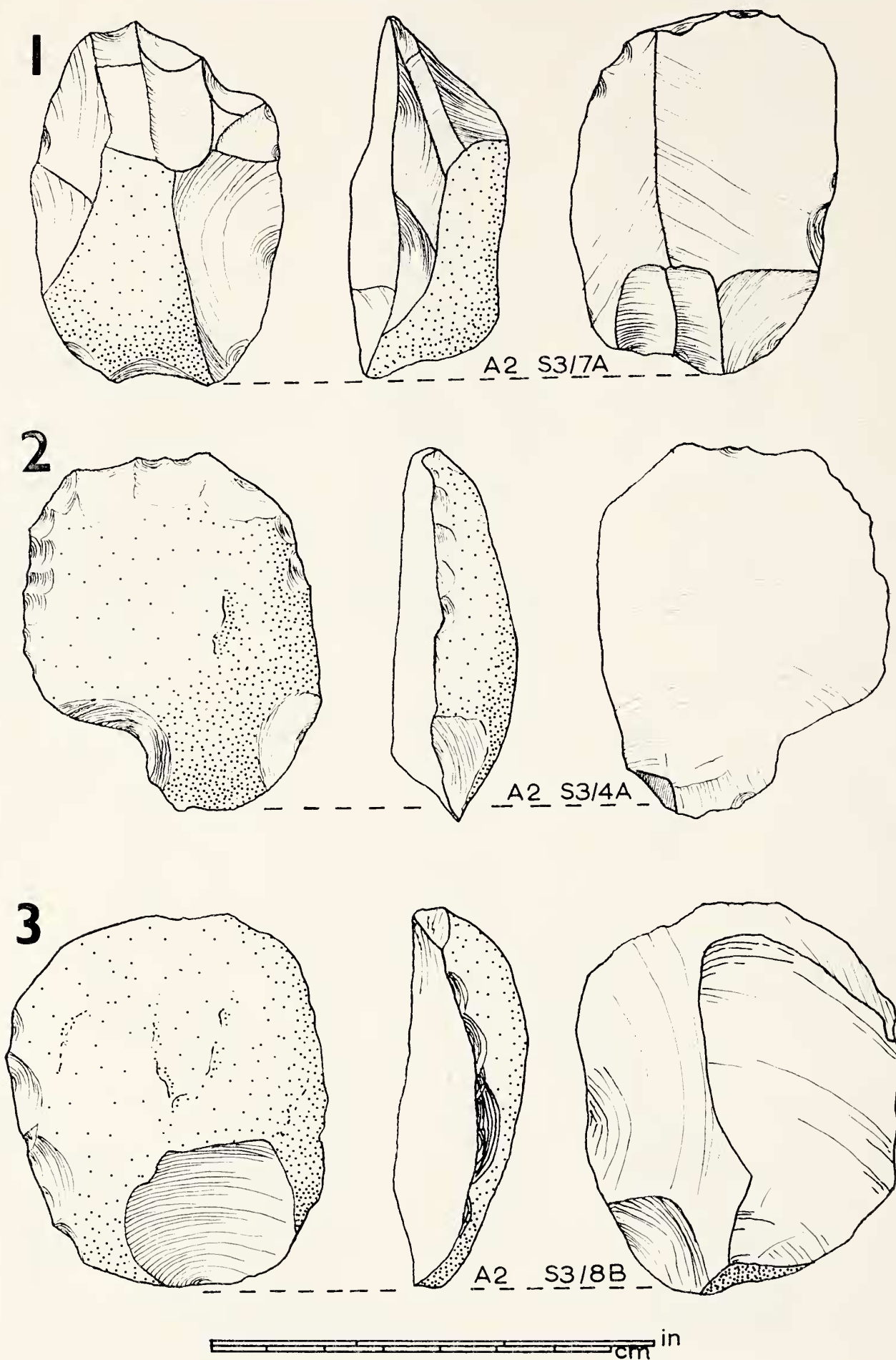


PLATE 47. AMANZI: Flakes.

(A2S3/7A, 4A and 8B). Three small scrapers on primary flakes from Surface 3 in the Deep Sounding of Area 2.

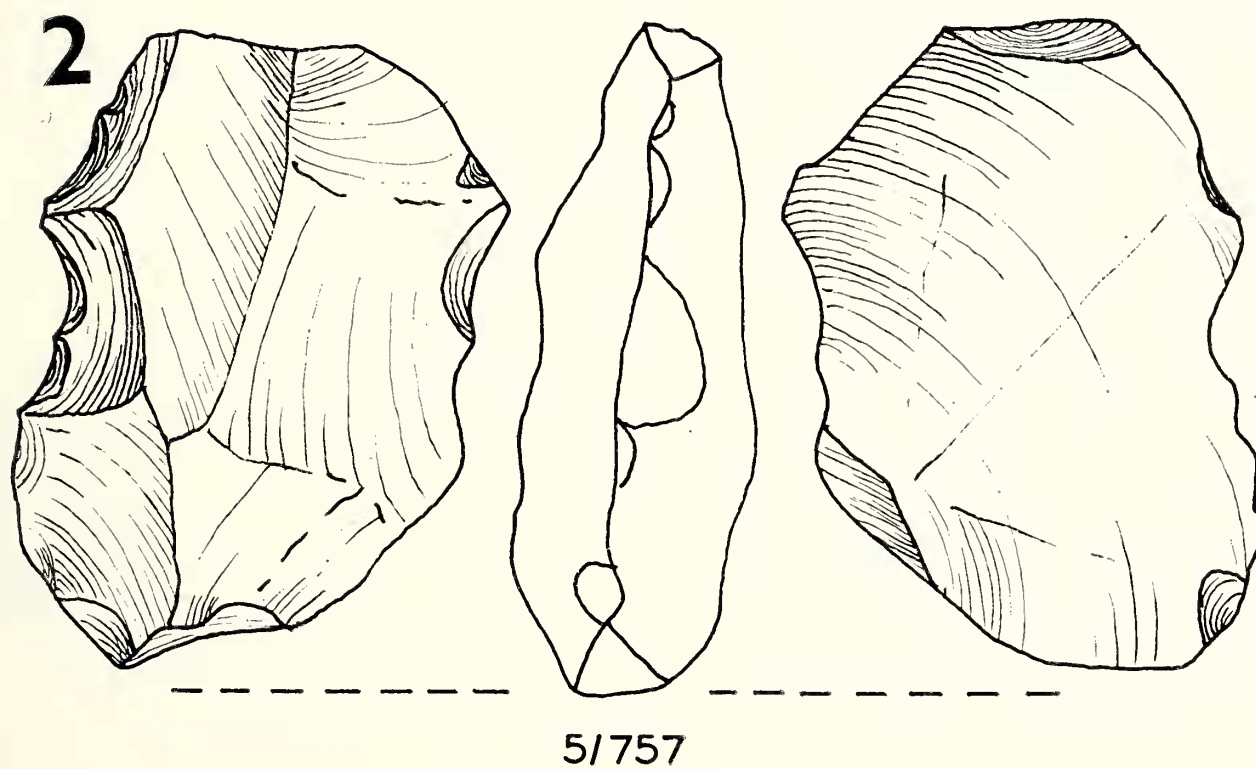
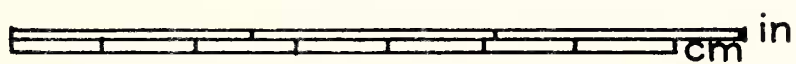
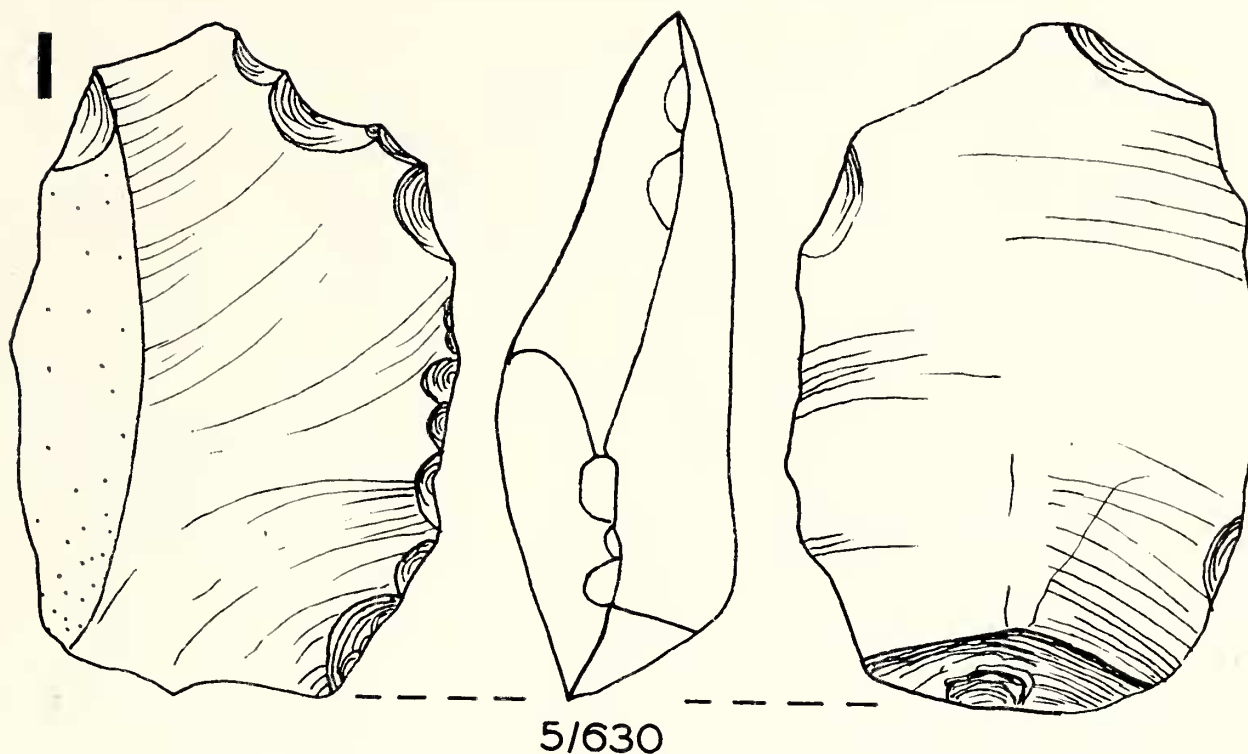
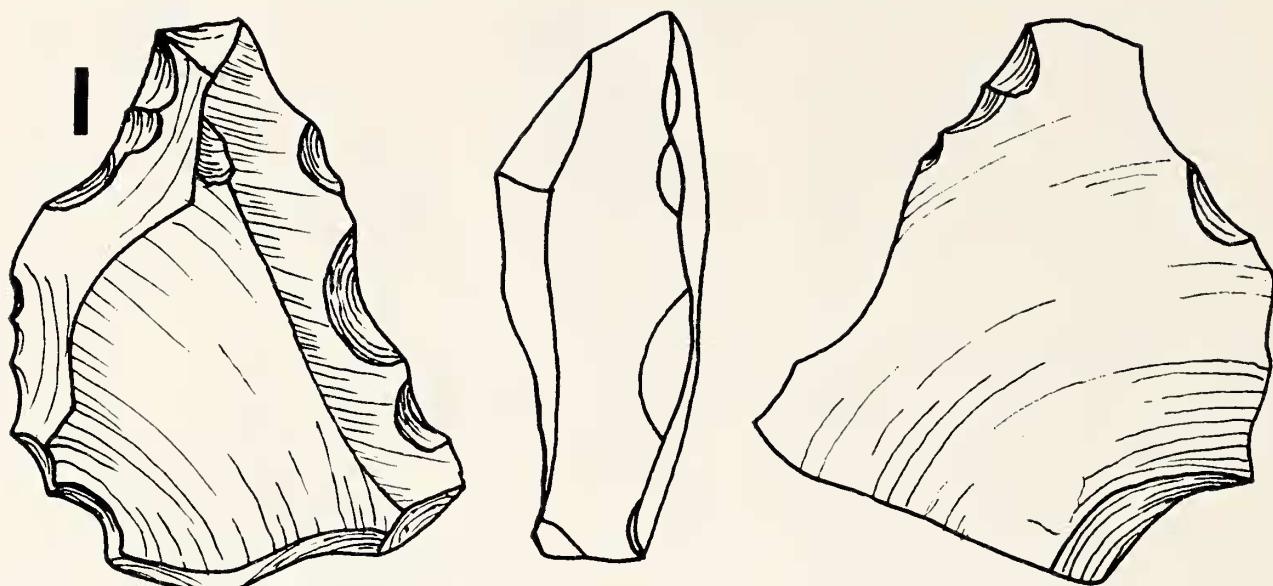
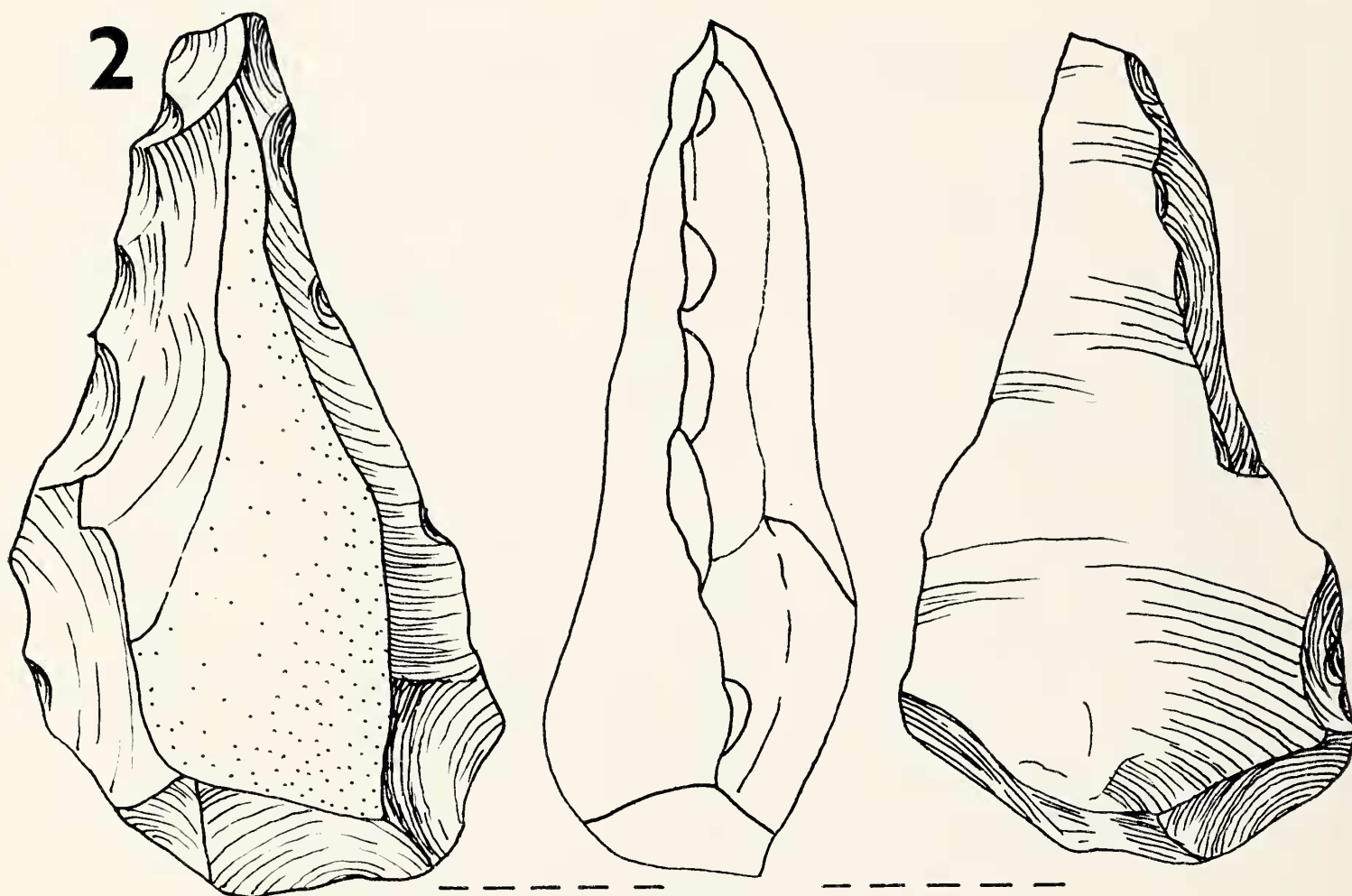
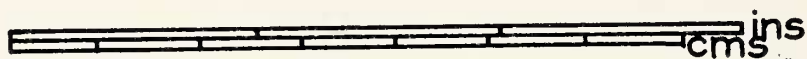


PLATE 48. AMANZI: Flake Scrapers.

1. (5/630). Small flake side scraper from Cutting 5, Area 2.
2. (5/757). Small flake side scraper showing notching. From Cutting 5, Area 2.



5/582



5/652

PLATE 49. AMANZI: Flake Scrapers.

1. (5/582). Small flake double-side scraper from Cutting 5, Area 2.
2. (5/652). Small flake double-side scraper from Cutting 5, Area 2.

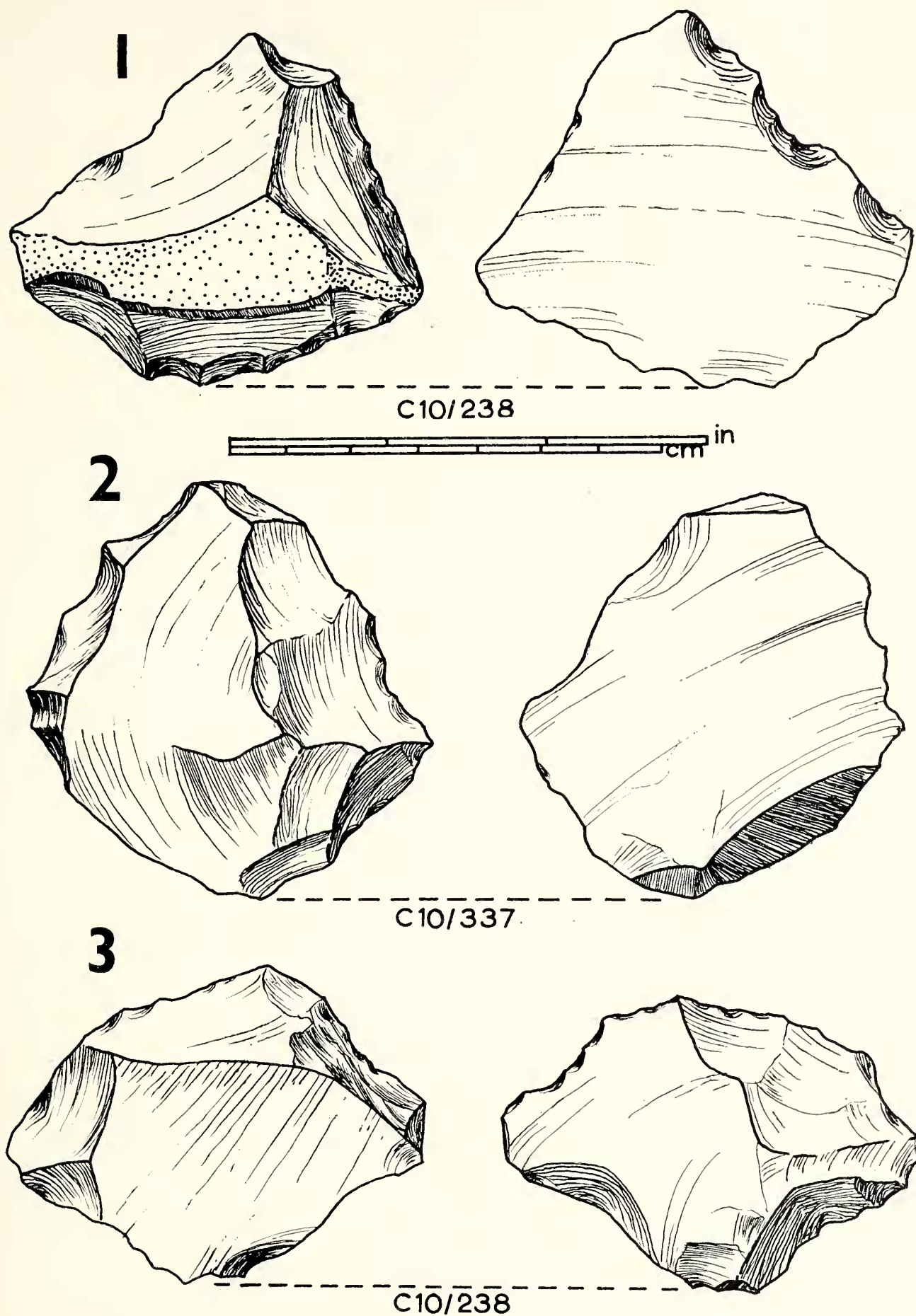


PLATE 50. AMANZI: Flakes.

(C10/238, 337, 238). Three small flakes from Area 1, Cutting 10 showing scraper retouch and what is considered to be the typical flaking on the dorsal surface of flakes struck from a radial core.

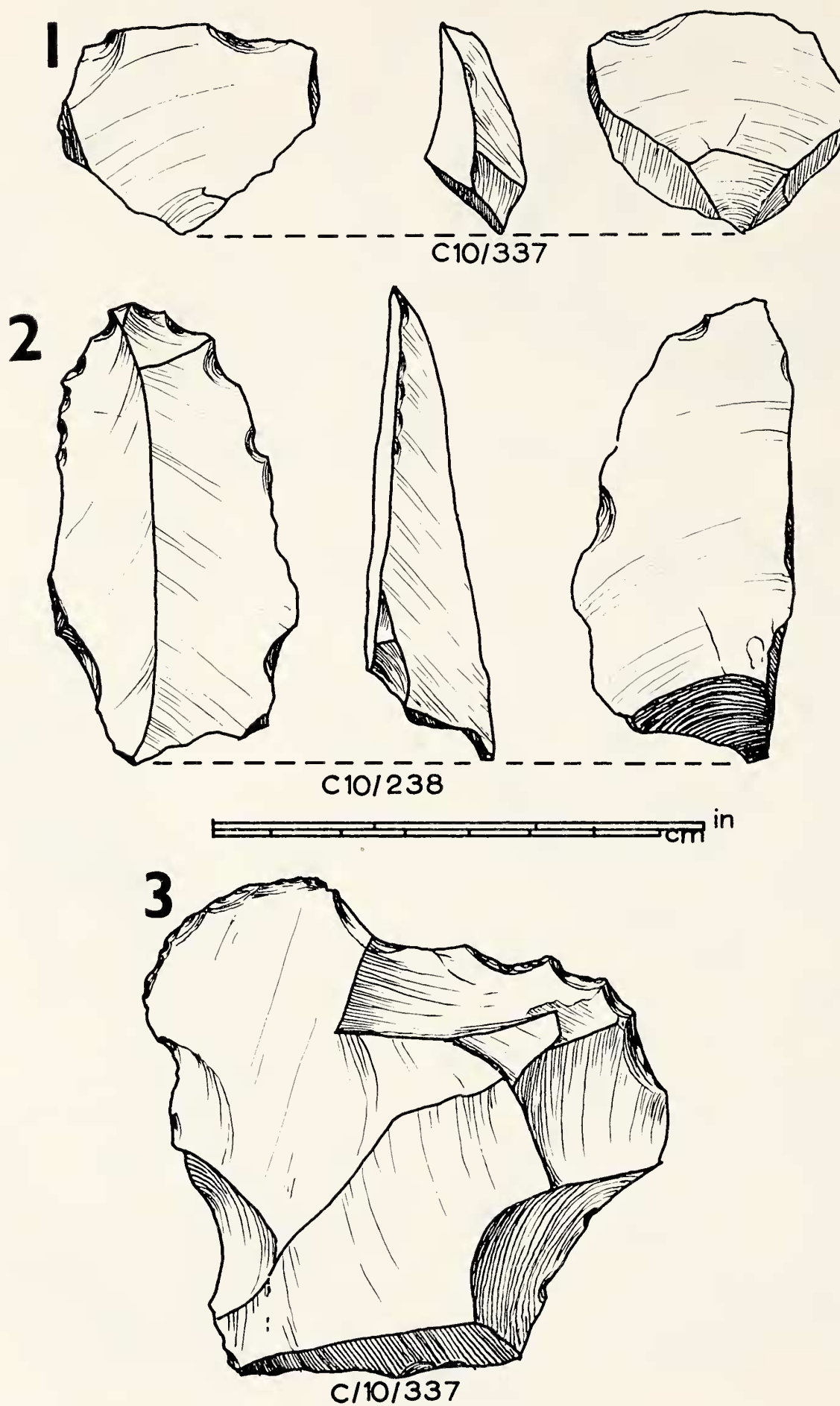


PLATE 51. AMANZI: Flakes.

(C10/337, 238, 337). Two small trimmed flakes (top and center) showing the variation in size and extent of trimming, and (bottom) an irregular flake with scraper retouch. From Cutting 10, Area 1.

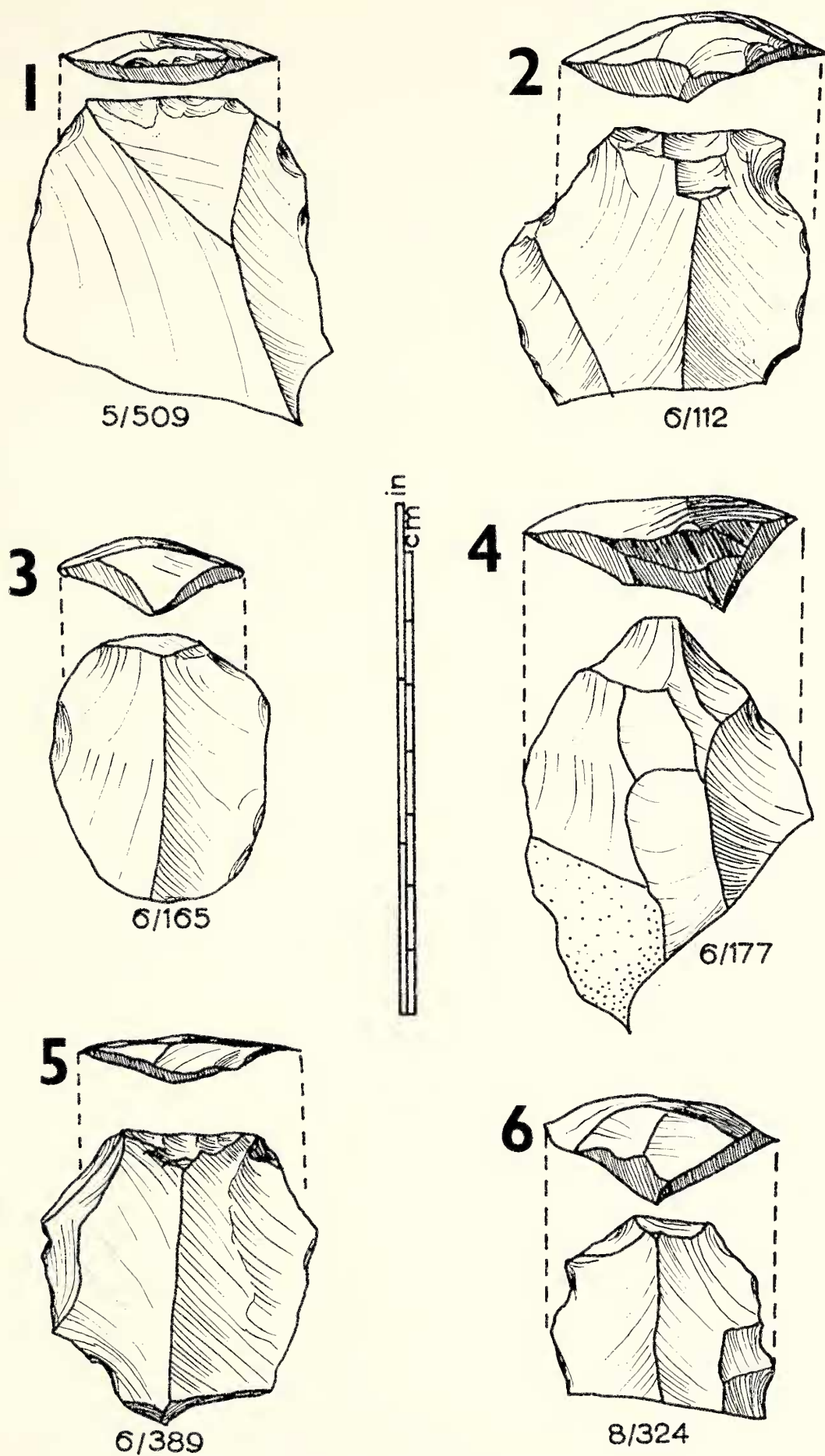


PLATE 52. AMANZI: Flakes.

(5/509, 6/112, 6/165, 6/177, 6/389, 8/324). These are the range of flakes which, on typological grounds, are foreign to the Early Stone Age artefact samples and are considered intrusives. The samples are all from Area 2.